CITY OF REDLANDS

CITY COUNCIL

A G E N D A

OCTOBER 21, 2025

MARIO SAUCEDO
Mayor

MARC SHAW
Mayor Pro Tempore

PAUL BARICH
Council Member

EDDIE TEJEDA
Council Member

DENISE DAVIS
Council Member

***

JEANNE DONALDSON
City Clerk

PHILLIP DOOLITTLE
City Treasurer

CHARLES M. DUGGAN JR.
City Manager

YVETTE M. ABICH GARCIA
City Attorney

5:00 p.m. Open Public Meeting, Public Comment (Closed Session)
6:00 p.m. Open Session (Public Meeting)

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City Council Chambers
Civic Center, 35 Cajon Street, Redlands, California

A G E N D A

The following information comprises the agenda for the regular meeting of the City Council of the City of Redlands at the times noted below in the City Council Chambers, Civic Center, 35 Cajon Street, Redlands, California, on:

TUESDAY, OCTOBER 21, 2025

To join via Zoom on a computer, laptop, or smart device
Please visit www.zoom.us, click on Join a Meeting
Enter the **Meeting ID 896 2789 8341**, then run the Zoom launcher
To join via Zoom with audio only (cell phone or landline):
Dial **1-877-853-5247**
Enter the **Meeting ID 896 2789 8341**

Should the City lose connectivity on Zoom, we will halt the meeting until it can be restored. To check on the status of remote connectivity in the event of an outage, go to the City's website at www.cityofredlands.org or to the City's Facebook page at @CityofRedlands or the Instagram page at @CityofRedlands_CityHall.

In the event the City cannot reestablish Zoom connectivity in a reasonable amount of time, the mayor will adjourn the meeting to a future date.

***PLEASE NOTE**:* Anyone desiring to speak on an agendized item at this meeting may do so during the consideration of that item. Due to time constraints and the number of persons who may wish to give oral testimony, public comments will be limited to three (3) minutes.

- **To provide comment while participating from Council Chambers:**
  - Although it is not required, speakers are encouraged to submit a "Speaker Sign Up Sheet" before the meeting is convened. Forms are available in the Office of the City Clerk or in Council Chambers.
  - After the meeting has convened, you may place the speaker form in the basket at the table along the north wall of the Chambers. Please do not disturb the City Clerk while the meeting is in progress.

- **To provide comment through Zoom (on a computer, laptop, or smart device)**:
  - Click the "Raise Hand" button and the moderator will unmute you when it is your turn to speak

- **To provide comment via audio only (cell phone or landline)**:
  - Dial *9 to "Raise Hand". The moderator will identify you by your area code and last 3 numbers of your telephone number when it is your turn to speak.



PLEASE SILENCE CELL PHONES, PAGERS AND OTHER ELECTRONIC COMMUNICATION DEVICES UPON ENTERING THE CHAMBERS

5:00 P.M.

A. **Call City Council Meeting to Order.**

B. **Public Comment**
(Any person wishing to provide public comment on a closed session matter may do so at this time.)

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C. **Recess City Council Meeting to a Closed Session**

1. Conference with Legal Council- Anticipated Litigation Pursuant to Government Code Sections 54956.9(d)(2) and (e)(3):
A point has been reached where, in the opinion of the legislative body of the local agency on the advice of its legal counsel, based on existing facts and circumstances, there is a significant exposure to litigation against the local agency, based on the receipt of a government claim from claimant Martha Farquhar threatening litigation (copy available for public inspection in City Clerk's Office).

6:00

D. **Reconvene City Council Meeting**

E. ***Invocation by Council Member Davis***
Pledge of Allegiance
(In keeping with long-standing traditions of legislative invocations, this City Council meeting may include a brief invocation. Such invocations are not intended to proselytize or advance any one, or to disparage any other, faith or belief. Neither the City nor the City Council endorses any particular religious belief or form of invocation.)

F. **Closed Session Report**
(No reportable action taken in closed session unless otherwise announced by the City Attorney at this time.)

G. **Public Comment - City Council**
(At this time, the City Council will provide an opportunity for the public to address them on any subject, within the jurisdiction of the City Council, which is not already scheduled on this agenda. However, any matter that requires action will be referred to staff for a report and possible action at a subsequent meeting. Comments will be limited to three {3} minutes.)

H. **Consent Calendar**
(The following routine items have been recommended for approval and will be acted upon simultaneously unless separate discussion and/or action is requested by a Councilmember or a member of the audience.)

1. Approve minutes of the regular meeting of October 7, 2025 (City Clerk Donaldson)

2. Adopt Resolution No. 8728 pursuant to Government Code Section 54221 declaring that certain real property located at 21 N. Church Street (APN: 071-089-13-0000) is surplus land, authorizing the City Manager, or his designee, to send notices of availability as to the surplus land, and determining that approval of the resolution is exempt from environmental review pursuant to Section 15061(b)(3) of the State's guidelines implementing the California Environmental Quality Act (Assistant City Manager Boatman)

3. Approve Memorandum of Understanding with CAL FIRE Conservation Camp Program for the provision of labor and support on conservation, fuels management and hazard reduction projects (Fire Chief Sessler)

4. Approve Resolution No. 8729 authorizing the City Manager to approve certain workers' compensation payments and settlements. (Human Resources Director Meteau)

Recycled Paper

5. Approve the First Amendment to the Agreement with Planetbids for an eProcurement System (Management Services/Finance Director Garcia)

6. Approve a Sole Source Procurement Waiver and Professional Services Agreement with CDM Smith Inc. to provide construction engineering support services for the construction phase of the Joint Utilities Laboratory Building Renovation and Expansion Project Phase 1, and bidding support services for Phase 2 of this project for an amount not-to-exceed $155,420 and determine that this action is exempt from environmental review pursuant to Section 15061(b)(3) of the State's guidelines implementing the California Environmental Quality Act (Municipal Utilities and Engineering Director Harris)

7. Approve the use of city resources and the request for in-kind support in the amount of $53,140.71 related to the Redlands Christmas Parade event hosted by the Kiwanis Club on December 6, 2025; approve temporary street closures related to the event; and determine that the event is categorically exempt from environmental review pursuant to Section 15311 (c) of the State's guidelines implementing the California Environmental Quality Act (Facilities and Community Services Director Crocker)

8. Approve an Agreement with Wildlife Control Service, Inc. for Pest Abatement Services for an amount not-to-exceed $225,000.60 (Facilities and Community Services Director Crocker)

I. Communications

1. Conference Report- 2025 League of California Cities Annual Conference and Expo (Mayor Pro Tem Shaw and Council Member Davis)

J. New Business

1. Consideration of the following ordinances proposing to amend Title 15, Chapter 15.32 (Flood Damage Prevention) of the Redlands Municipal Code pertaining to floodplain management and flood damage prevention, and consideration of a determination of exemption from environmental review pursuant to Sections 15061(b)(3) and 15378(b)(5) of the California Environmental Quality Act Guidelines.

    1. Adoption of Urgency Ordinance No. 2991,entitled, "An Urgency Ordinance of the City of Redlands Adopting Immediate Code Text Amendments to Title 15, Chapter 15.32 of the Redlands Municipal Code Relating to Flood Damage Prevention and Floodplain Management; and Declaring an Urgency for the Purpose of Protecting the Public Health, Safety, and General Welfare for Persons and Properties Within the City of Redlands;" and,

    2. Introduce Ordinance No. 2992, entitled, "An Ordinance of the City of Redlands Amending Title 15, Chapter 15.32 of the Redlands Municipal Code Relating to Flood Damage Prevention and Floodplain Management." (Development Services Director Desatnik)

2. Consideration of the adoption of Ordinance No. 2990 - Authorizing an amendment to the contract between the City Council of Redlands and the Board of Administration of the California Public Employees' Retirement System (Human Resources/Risk Management Director Meteau)

3. Consideration of a Public Works Construction Contract with Demo Leaders, Inc. for the WWTP Hillside Stabilization Project for an amount not-to-exceed $299,828.44, and determination that the Project is categorically exempt from environmental review pursuant to Section 15301 of the State's guidelines implementing the California Environmental Quality Act (Municipal Utilities and Engineering Director Harris)

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4. Consideration of a Public Works Construction Contract with Elegant Construction, Inc. for the Joint Utilities Laboratory Building Renovation and Expansion Project for an amount not-to-exceed $3,097,000, and determination that this action is exempt from environmental review pursuant to Section 15301(e)(1) of the State's guidelines implementing the California Environmental Quality Act (Municipal Utilities and Engineering Director Harris)

5. Consideration of a sole source Professional Services Agreement with Civil & Environmental Consultants, Inc. for engineering design and permitting services for the site integration of an ultra-low emissions flare at the California Street Landfill and Wastewater Treatment Plant in an amount not-to-exceed $268,200 (Facilities and Community Services Director Crocker)

6. Consideration of a $725,210.49 purchase order modification with Enterprise FM Trust for the vehicle lease and maintenance program resulting in a total purchase order amount not to exceed $3,791,433.53 and a total contract amount not-to-exceed $8,519,823.38 (Facilities and Community Services Director Crocker)

K. **Individual Council Member Announcements and/or Reports on Activities**
(No collective discussion or action.)

L. **Adjournment**
The next regular meeting of the City Council will be held on November 4, 2025.

If you challenge any proposed development entitlement listed on this agenda in court, you may be limited to raising only those issues you or someone else raised at the public hearing described in this notice, or in written correspondence delivered to the City Council at or prior to this public hearing.

In compliance with the Americans with Disabilities Act, if you need special assistance to participate in this meeting, please contact Goutam Dobey, of the Municipal Utilities and Engineering Department at (909) 798-7584 ext 2. Notification 48 hours prior to the meeting will enable the City to make reasonable arrangements to ensure accessibility to this meeting.

(28 CFR 35.102-35.104 ADA Title II)

Any writings or documents distributed to a majority of the City Council regarding an open session agenda item less than 72 hours before this meeting are available for public inspection at the City Clerk's Office or at the dais of the City Clerk once the open session begins.

Staff reports or other written documentation relating to items referred to on the agenda are available at the A. K. Smiley Public Library, 125 West Vine Street, Redlands, California, and on the City's website referenced below.

Regular meetings are televised live on Redlands TV Channel 3 (Spectrum) and Channel 35 (Frontier) and re-broadcast at 7:00 P.M. the following Wednesday, Friday and Sunday; and at 9:00 A.M. Thursday, Saturday and Monday. Meetings are also streamed live and archived for later viewing on demand on the City's website at www.cityofredlands.org. Agendas, staff reports and minutes of the City Council of the City of Redlands are available online at: www.cityofredlands.org.

Recycled Paper

City Council Meeting **H. 1.**

DATE: 10/21/2025

TO: Honorable Mayor and City Council Members

SUBJECT: Approve minutes of the regular meeting of October 7, 2025 (City Clerk Donaldson)

MOTION:

I move to approve the regular meeting minutes of October 7, 2025.

Attachments

Regular Meeting Minutes of October 7, 2025

MINUTES

Regular meeting of the City Council of the City of Redlands held in the Council Chambers, Civic Center, 35 Cajon Street, on October 7, 2025 at 5:00 P.M.

Present: Mario Saucedo, Mayor
Marc Shaw, Mayor Pro Tempore
Paul Barich, Council Member
Eddie Tejeda, Council Member
Denise Davis, Council Member

Staff: Charles M. Duggan, Jr., City Manager; Yvette M. Abich Garcia, City Attorney; Jeanne Donaldson, City Clerk; Janice McConnell, Assistant City Manager; Chris Boatman, Assistant City Manager; Carl Baker, Public Information Officer; Danielle Garcia, Management Services/Finance Director; Brian Desatnik, Development Services Director; John Harris, Municipal Utilities and Engineering Director; Rich Sessler, Fire Chief; Rachel Tolber, Police Chief; Tabitha Crocker, Facilities and Community Services Director; Robert Meteau, HR/Risk Management Director

Mayor Saucedo called the meeting to order and explained that comments could be presented in-person, via Zoom, via cell phone or landline. He offered the public an opportunity to provide comment on any item on the agenda for the closed session.

PUBLIC COMMENT

None forthcoming

CLOSED SESSION

Conference with legal counsel: Existing Litigation - Government Code §54956.9(d)(1)
(City Attorney Garcia)
Three Cases:

a. Rogers, et al. v. City of Redlands, San Bernardino Superior Court, Case No. CIVSB2126031
b. Holzer v. City of Redlands, et al., San Bernardino Superior Court, Case No. CIVSB2322787
c. Miller & Associates, Inc. v. City of Redlands, San Bernardino Superior Court, Case No. CIVSB2203755

RECONVENE CITY COUNCIL MEETING

The meeting reconvened at 6:00 P.M. with an invocation by Mayor Saucedo. The Pledge of Allegiance to the American flag was conducted by McKinley Elementary Peer Mediators.

CLOSED SESSION REPORT

City Attorney Garcia announced the following report related to Closed Session actions:

Item C.1a. and C.1b. – There was no reportable action
Item C.1c. – Pursuant to government code section 54957.1(a)(3)(a) the City Council took action to approve a proposed settlement in the matter of Miller & Associates, Inc v City of Redlands, based on the following terms:

- City of Redlands shall have the option to either purchase the property at 611 W Redlands Blvd for $3.4 million; or pay plaintiff $2.1 million to settle the lawsuit
- Plaintiff shall release all claims, known and unknown, against the City and dismiss its lawsuit against the City, with prejudice
- The Mayor is authorized to sign the settlement agreement on behalf of the City; and a copy of the Agreement will be available in the City Clerk's office once executed by all the parties
- Motion to approve the settlement was made by Mayor Pro Tem Shaw, seconded by Council Member Barich, and passed unanimously.

PRESENTATIONS

Redlands Pet Adoption

Animal Services Supervisor Joe Alcarez and Kennel Attendant Laura Contreras showed off "Autumn", a four-year-old female German Shepherd, who is available for adoption, along with thirty-eight other dogs at the Redlands Animal Shelter. Mr. Alcarez provided the Shelter statistics for September 2025, which included: 24 adopted dogs and 10 adopted cats.

National Fire Prevention Week Proclamation

Mayor Saucedo presented the National Fire Prevention Week Proclamation to Fire Chief Rich Sessler, Fire Marshal Vince Anderson, and Deputy Fire Marshal Justin Day.

Hindu Heritage Month Proclamation

Council Member Tejeda presented the Hindu Heritage Month Proclamation to Roop Goyal, Human Relations Commissioner.

PUBLIC COMMENT

Taxes - Dennis Bell was opposed to the Council raising any taxes and insisted the voters should be the ones to determine whether surcharges be increased.

School Shootings - Michael Paisner read aloud several names of student victims, ranging from kindergarten to twelfth grade, who were murdered during recent school shootings. He reminded the Council of their responsibility, noting that as elected leaders, their words and actions carry significant weight. He requested they be mindful about who and what they support and promote.

Litigation- Stephen Rogers said the court had ruled in his favor with regard to the litigation he brought against the City related to the solid waste surcharges found on utility users' solid waste

bills. These PARIS surcharges should be removed as ordered by the court, but he was concerned that the city may not be meeting the requirements because there was no civil engineer managing the program.

Various - Robert Ceja said that many people were struggling to pay their bills and any additional taxes or surcharges would make things even more difficult. He pointed out that the impact of school shootings affects everyone in such a profound way. He supported gun ownership but thought that stricter gun regulations were needed.

CONSENT CALENDAR

Minutes

On motion of Council Member Paul Barich, seconded by Council Member Eddie Tejeda, the City Council unanimously approved, by roll call vote, the regular meeting minutes of September 16, 2025.

Vote: 5 - 0 Passed

Proclamation October 19-25, 2025 Childhood Lead Poisoning Prevention Week

On motion of Council Member Paul Barich, seconded by Council Member Eddie Tejeda, the City Council unanimously authorized, by roll call vote, the issuance of a Proclamation declaring October 19-25, 2025 as Childhood Lead Poisoning Prevention Week.

Vote: 5 - 0 Passed

Proclamation National Fire Prevention Week

On motion of Council Member Paul Barich, seconded by Council Member Eddie Tejeda, the City Council unanimously authorized, by roll call vote, the issuance of a Proclamation recognizing National Fire Prevention Week from October 5-11, 2025.

Vote: 5 - 0 Passed

Proclamation October 2025 Hindu Heritage Month

On motion of Council Member Paul Barich, seconded by Council Member Eddie Tejeda, the City Council unanimously authorized, by roll call vote, the issuance of a Proclamation declaring the month of October 2025 Hindu Heritage Month in the City of Redlands.

Vote: 5 - 0 Passed

Resolution No. 8721 National Opioids Settlement

On motion of Council Member Paul Barich, seconded by Council Member Eddie Tejeda, the City Council unanimously approved, by roll call vote, Resolution No. 8721 authorizing the City of Redlands' participation in the National Opioids Settlement with Purdue Pharma and additional settling defendants: Alvogen, Amneal, Apotex, Hikma, Indivior, Mylan, Sun, and Zydus; and authorized the City Manager, or his designee, to execute any and all required participation documents through the Opioid Settlement Funds Portal, as this is the only method for execution and coordination of wet signatures would be impracticable.

Vote: 5 - 0 Passed

Resolution Nos. 8718 & 8719 Outside City Water Service Connection

On motion of Council Member Paul Barich, seconded by Council Member Eddie Tejeda, the City Council unanimously adopted, by roll call vote, Resolution No. 8718 for a new water service connection to the City of Redlands water distribution system at 1320 Malachite Avenue (APN: 0298-145-30-0000) in the unincorporated community of Mentone; and adopted Resolution No. 8719 relating to Pre-Annexation Agreement No. 25-01.

Vote: 5 - 0 Passed

Annual Review Development Agreements

On motion of Council Member Paul Barich, seconded by Council Member Eddie Tejeda, the City Council unanimously approved, by roll call vote, to receive and file the Notice to conduct an annual review of approved Development Agreements in accordance with Chapter 18.220 of the Redlands Municipal Code. The following Development Agreements will be subject to an annual review for calendar year 2024: 1) Mountainview Power Company; 2) Robertson's Ready Mix, Ltd; 3) Cemex Construction Materials, L.P.; 4) Cal-Red Facility, LLC, a Delaware limited liability company, and Redlands Health Services and AV Associates; 5) Redlands Community Hospital; 6) ESRI (Environmental Systems Research Institute); 7) VPV State Street Village, LLC.

Vote: 5 - 0 Passed

First Amendment for Video Management System Replacement

On motion of Council Member Paul Barich, seconded by Council Member Eddie Tejeda, the City Council unanimously approved, by roll call vote, the First Amendment to the Agreement with CelPlan Technologies Incorporated for Video Management System Replacement to expand camera coverage in the City. The proposed amendment, totaling $119,020, would fund the installation of these supplemental cameras and the necessary network enhancements, ensuring broader coverage and continued improvement of the City's surveillance capabilities.

Vote: 5 - 0 Passed

Annual Maintenance Payment Computer Aided Dispatch/Records Management System

On motion of Council Member Paul Barich, seconded by Council Member Eddie Tejeda, the City Council unanimously authorized, by roll call vote, the annual maintenance payment to Motorola Solutions, Inc. in the amount of $118,649.92 for the Police Department's Spillman Computer Aided Dispatch/Records Management System.

Vote: 5 - 0 Passed

Pavement Condition Evaluation and Pavement Management System Agreement

On motion of Council Member Paul Barich, seconded by Council Member Eddie Tejeda, the City Council unanimously determined, by roll call vote, that approval of the Professional Services Agreement with Bucknam Infrastructure Group, Inc. to update the Pavement Condition Evaluation and Pavement Management System is exempt from environmental review pursuant to section 15061(b)(3) of the guidelines implementing the California Environmental Quality Act; and approved the Professional Services Agreement with Bucknam Infrastructure Group, Inc. for an amount not-to-exceed $95,593 to update the Pavement Condition Evaluation and Pavement Management System.

Vote: 5 - 0 Passed

Contract Award Palo Alto Storm Drain Improvement Project

On motion of Council Member Paul Barich, seconded by Council Member Eddie Tejeda, the City Council unanimously determined, by roll call vote, that approval of a Public Works Construction Contract with Metrocell Construction, Inc. for the Palo Alto Storm Drain Improvement Project is categorically exempt from environmental review pursuant to Section 15301(c) of the State's guidelines implementing the California Environmental Quality Act; approved the Palo Alto Storm Drain Improvement Project plans and specifications, and awarded a Public Works Construction Contract to Metrocell Construction, Inc. for an amount not-to-exceed $83,093.80; and approved an additional appropriation of $13,093.80 from the Storm Drain Fund (405) unassigned fund balance.

Vote: 5 - 0 Passed

Water Utility and Wastewater Utility Rate Study Services Agreement

On motion of Council Member Paul Barich, seconded by Council Member Eddie Tejeda, the City Council unanimously determined, by roll call vote, that approval of a Professional Services Agreement with Raftelis is exempt from environmental review pursuant to Section 15061(B)(3) of the State's guidelines implementing the California Environmental Quality Act; and approved the Professional Services Agreement with Raftelis to prepare a Water Utility and Wastewater Utility Rate Study for a value not-to-exceed $154,888.

Vote: 5 - 0 Passed

PO Extension with USALCO for FY 25/26

On motion of Council Member Paul Barich, seconded by Council Member Eddie Tejeda, the City Council unanimously determined, by roll call vote, that approval of the annual Purchase Order extension with USALCO for FY 25/26 is exempt from environmental review pursuant to section 15301 of the State's guidelines implementing the California Environmental Quality Act; and approved the annual Purchase Order extension with USALCO for FY 25/26 for an amount not-to-exceed $150,000.00. The Water Utility Division operates and maintains two conventional surface water treatment plants that utilize an Aluminum Chlorohydrate solution for primary coagulation.

Vote: 5 - 0 Passed

Traffic Regulations Resolution No. 8717 STOP Control

On motion of Council Member Paul Barich, seconded by Council Member Eddie Tejeda, the City Council unanimously determined, by roll call vote, that the adoption of Resolution No. 8717 is exempt from environmental review pursuant to Section 15301(c) of the State's guidelines implementing the California Environmental Quality Act; and adopted Resolution No. 8717, to implement a STOP control on the eastbound Florida Street/17th Street intersection.

Vote: 5 - 0 Passed

In-Kind Support Citrus Valley Band Tournament

Facilities and Community Services Director Crocker reviewed the request for in-kind support in the amount of $2,250.00 related to the Citrus Valley Band Tournament hosted by the Citrus Valley Music Boosters on October 11, 2025. Mayor Saucedo introduced a few members of the Citrus Valley Band who described this event as the largest fundraiser of the year, and they invited everyone to attend and support the performing bands.

On motion of Mayor Pro Tempore Marc Shaw, seconded by Council Member Denise Davis, the City Council unanimously determined, by roll call vote, that the approval of the event is exempt from environmental review pursuant to Section 15311(c) of the State's guidelines implementing the California Environmental Quality Act; authorized the expenditure of city resources, in-kind support, in the amount of $2,250.00 related to the Citrus Valley Band Tournament, hosted by the Citrus Valley Music Boosters on October 11, 2025; approved temporary street closures related to this event to be held on October 11, 2025.

Vote: 5 - 0 Passed

REVEL Big Bear Marathon Event Temporary Street Closure Request

On motion of Council Member Paul Barich, seconded by Council Member Eddie Tejeda, the City Council unanimously determined, by roll call vote, that the approval of the event is exempt from environmental review pursuant to Section 15311(c) of the State's guidelines implementing the California Environmental Quality Act; and approved the request for the temporary street closure of San Bernardino Avenue and the sale and consumption of alcoholic beverages related to the REVEL Big Bear Marathon event hosted by the Brooksee Foundation on November 8, 2025.

Vote: 5 - 0 Passed

In-Kind Support Veterans Day Parade Event

Facilities and Community Services Director Crocker introduced the request for in-kind support in the amount of $21,301.00 related to the Veterans Day Parade event hosted by the Redlands Hometown Heroes Foundation on November 11, 2025. As public comment, Mick Gallagher, Board Chair of the Hometown Heroes Foundation, announced that this marks the twelfth year of the parade, which has proven to be a great success and honors all veterans. This year also marks the 250th anniversary of the United States Army, U.S. Navy and Marine Corps, and the 50th anniversary of the end of the Vietnam War. He thanked the Council and the City, at large, for their ongoing support of veterans and invited everyone to attend.

On motion of Council Member Eddie Tejeda, seconded by Council Member Paul Barich, the City Council unanimously determined, by roll call vote, that the approval of the event, hosted by the Redlands Hometown Heroes Foundation, is exempt from environmental review pursuant to Section 15311(c) of the State's guidelines implementing the California Environmental Quality Act; authorized the expenditure of city resources, in-kind support in the amount of $21,301.00, and temporary street closures related to this event; and authorized the sale and consumption of alcoholic beverages during the Veterans Day Parade to be held on November 11, 2025.

Vote: 5 - 0 Passed

In-Kind Support Resident Expo hosted by Redlands Visitor Center

On motion of Council Member Paul Barich, seconded by Council Member Eddie Tejeda, the City Council unanimously determined, by roll call vote, that the approval of the event is exempt from environmental review pursuant to Section 15311(c) of the State's guidelines implementing the California Environmental Quality Act; and authorized the expenditure of city resources, in-kind support in the amount of $900.00 related to the Resident Expo hosted by the Redlands Visitor Center; and approved temporary street closures related to the event to be held on November 8, 2025.

Vote: 5 - 0 Passed

COMMUNICATIONS

Cancellation January 6, 2026 City Council Meeting

Mayor Saucedo opened the discussion and recommended the Council cancel the January 6, 2026, regular meeting of the City Council in light of the December holiday closure. The next regular meeting will be held on January 20, 2026.

On motion of Council Member Paul Barich, seconded by Council Member Denise Davis, the City Council unanimously approved, by roll call vote, the cancellation of the January 6, 2026, regular meeting of the City Council in light of the December holiday closure. The next regular meeting will be held on January 20, 2026.

Vote: 5 - 0 Passed

Paramedics Parcel Assessment and Analysis

Management Services/Finance Director Garcia presented the results of the preliminary analysis relating to Paramedics Parcel Assessment and outlined potential next steps. The report provided updated information on the cost of providing paramedic services vis-à-vis the revenue collected from the Paramedics Parcel Tax. Current paramedic program expenses include personnel (e.g., paramedic pay incentive for firefighter rank through captain rank, EMS Coordinator and Medical Director), required medications and equipment, and clinical consumables / patient care supplies (i.e., bandages, syringes, etc.).

This additional analysis is intended to clarify accounting and budgeting practices that may have complicated the way paramedic service costs have appeared in prior reports. Revenue in this category is collected from each non-vacant parcel within City limits. The City Council authorizes this levy every summer for placement on the tax roll for the ensuing fiscal year. The County Assessor’s office collects this and all other property-related charges from property owners and remits corresponding amounts to the City directly through the special assessment process. As of the City's most recent request to add the paramedics tax to the County's tax roll for FY 2025-2026, there were 21,242 parcels upon which this levy was added. Vacant and irrigated parcels are excluded from this assessment.

Paramedics Services — Fiscal Year 2025 Analysis
- Program Costs: $1,276,000
- Program Revenue: $1,146,200
-Variance: +$129,800

Director Garcia pointed out that the variance of $129,800, can be managed within existing General Fund appropriations. She said staff can continue to periodically assess the costs of the paramedic program every 3 to 5 years. As public comment, Bill Blankenship thought the Paramedica Parcel Assessment program was structurally sound, and the numbers themselves were proof that a ballot measure was unnecessary. Andy Hoder questioned whether the city could establish an exemption or "benefit assessment" for veterans to adjust their Paramedic Parcel Assessment. Council Members thanked staff for their thorough analysis. They discussed their preferences, and it was determined that at this time, they were not inclined to put forward a ballot measure to the voters. With no motion made, the matter was tabled.

PUBLIC HEARINGS

Resolution Nos. 8722 and 8723 CFD 2004-1 Annexation No. 28

Mayor Saucedo opened the public hearing and called on Development Services Director Desatnik for a report on Resolution Nos. 8722 and 8723 and a request from KL LB Buy 2, LLC and Tri Pointe Homes IE-SD, Inc., regarding the annexation of approximately 37.87 acres of land located at the southwest corner of San Bernardino Avenue and Wabash Avenue. If approved, the action would annex territory to Community Facilities District No. 2004-1 for the purposes of performing maintenance of street trees within the street right-of-way adjacent to Tract Map No 20473, and any other public services authorized by the act.

City Clerk Donaldson agreed to hold the special election within the annexing territory on October 7, 2025. As public comment, Stephen Rogers claimed that the Tri Pointe IE-SD development was processed fraudulently, which he reported as illegal activity to Police Chief Tolber and to the fraud division of the County DA's office. City Manager Duggan and City Attorney Garcia clarified to say the city takes these allegations seriously and has thoroughly reviewed and vetted the matter.

With no further comments, Mayor Saucedo closed the public hearing. City Clerk Donaldson conducted the special election and announced the results, with Tri Pointe Homes voting 2 Yes to 0 No and KL LB Buy 2, LLC voting 37 Yes and 0 No, for a total of 39 Yes votes to 0 No votes, determining the required two-thirds of the votes cast were in favor of levying the tax.

On motion of Mayor Mario Saucedo, seconded by Council Member Eddie Tejeda, the City Council unanimously determined, by roll call vote, that adoption of Resolution Nos. 8722 and 8723 are not subject to environmental review pursuant to Section 15061 (b)(3) of the California Environmental Quality Act, as the adoption of these Resolutions does not have the potential to cause a significant effect on the environment; On motion of Council Member Eddie Tejeda, seconded by Council Member Denise Davis, the City Council unanimously approved Resolution No. 8722, calling a special election of the question of levying special taxes within the territory to be annexed to CFD No. 2004-1 and On motion of Council Member Eddie Tejeda, seconded by Council Member Paul Barich, the City Council unanimously approved Resolution No. 8723 declaring t 8723 declaring the voting results (39 Yes to 0 No votes) of the special election of Annexation No. 28 to Community Facilities District No. 2004-1, were in favor of levying the tax, and therefore, the territory will be annexed to the CFD No. 2004-1.

Vote: 5 - 0 Passed

Resolution Nos. 8724 and 8725 CFD No. 2004-1 Annexation No. 30

Mayor Saucedo opened the public hearing and called on Development Services Director Desatnik for a report on Resolution Nos. 8724 and 8725 and a request from Meritage Homes of California, Inc., a California corporation, to annex approximately 12.05 acres of land located on the north side of West Pioneer Avenue and east of I-210. If approved the territory would be annexed to Community Facilities District No. 2004-1 (CFD) for the purposes of performing maintenance of a parking lot, infiltration basin, storm water treatment devices, landscaping, and street trees within lettered lot "I", lettered lot "F" and street right-of-way

adjacent to Tract Map No 20528, and any other public services authorized by the act. The Notice of Hearing was published and mailed as required by law.

City Clerk Donaldson agreed to hold the special election within the annexing territory on October 7, 2025. With no further comments, Mayor Saucedo closed the public hearing. City Clerk Donaldson conducted the special election and announced that Meritage Homes of California voted 13 Yes to 0 No votes, determining the required two-thirds of the votes cast were in favor of levying the tax.

On motion of Mayor Mario Saucedo, seconded by Council Member Eddie Tejeda, the City Council unanimously determined, by roll call vote, that adoption of Resolution Nos. 8722 and 8723 are not subject to environmental review pursuant to Section 15061 (b)(3) of the California Environmental Quality Act, as the adoption of these Resolutions does not have the potential to cause a significant effect on the environment; On motion of Council Member Eddie Tejeda, seconded by Council Member Denise Davis, the City Council unanimously approved Resolution No. 8724, calling a special election of the question of levying special taxes within the territory to be annexed to CFD No. 2004-1 and On motion of Mayor Mario Saucedo, seconded by Council Member Eddie Tejeda, the City Council unanimously approved Resolution No. 8725 declaring the voting results (13 Yes to 0 No votes) of the special election of Annexation No. 30 to Community Facilities District No. 2004-1, were in favor of levying the tax, and therefore, the territory will be annexed to the CFD No. 2004-1.

Vote: 5 - 0 Passed

NEW BUSINESS

Ordinance No. 2990 Amendment to CalPERS Contract

Human Resources/Risk Management Director Meteau provided background on Ordinance No. 2990 authorizing an amendment to the contract between the City Council of the City of Redlands and the Board of Administration of the California Public Employees' Retirement System. On September 16, 2025, the City Council adopted a Resolution of Intention as the initial step in the formal contract amendment process with the Board of Administration of the California Public Employees' Retirement System (CalPERS). The proposed amendment seeks to remove the current language excluding hourly employees from CalPERS membership, which is currently embedded in the contract between the City and the CalPERS Board of Administration. The next step in the process is for the City to introduce and adopt an Ordinance authorizing the amendment to the contract, which then allows CalPERS to proceed with the preparation of the final amendment documents for consideration at a future City Council meeting. It is CalPERS' recommendation to remove the exclusion and utilize Government Code section 20305.

On motion of Mayor Pro Tempore Marc Shaw, seconded by Council Member Denise Davis, the City Council unanimously introduced, by roll call vote, Ordinance No. 2990 authorizing an amendment to the contract between the City Council of the City of Redlands and the Board of Administration of the California Public Employees' Retirement System.

Vote: 5 - 0 Passed

WWTP Secondary Clarifier Rehabilitation Project Agreement

Municipal Utilities and Engineering Director Harris explained the need for a Non-Professional Services Agreement with Sentry Equipment for the Wastewater Treatment Plant Secondary Clarifier Rehabilitation Project for an amount not-to-exceed $529,337.60, which includes a ten percent contingency allowance. Sentry Equipment Corp. submitted the lowest responsive and responsible bid for this project.

On motion of Mayor Mario Saucedo, seconded by Mayor Pro Tempore Marc Shaw, the City Council unanimously determined, by roll call vote, that the Wastewater Treatment Plant Secondary Clarifier Rehabilitation Project is exempt from environmental review in accordance with Section 15302(c) of the State's guidelines implementing the California Environmental Quality Act; and approved the Non-Professional Services Agreement with Sentry Equipment for the Wastewater Treatment Plant Secondary Clarifier Rehabilitation Project for an amount not-to-exceed $529,337.60.

Vote: 5 - 0 Passed

First Amendment to Contract for 2023 CIP Water Pipeline and Highline Replacement Project

Municipal Utilities and Engineering Director Harris highlighted the salient facts of the First Amendment to the Public Works Construction Contract with MCC Pipeline, Inc. for the 2023 CIP Water Pipeline and Highline Replacement Project, which would increase the Contract contingency amount by $480,000. The additional work includes the installation of approximately 600 linear feet of 8-inch ductile iron pipe, 1,700 linear feet of PVC service pipe, and 225 linear feet of copper service pipe. Additionally, the street pavement conditions within the project corridor necessitated additional pavement restoration beyond the quantities originally anticipated in the contract. These adjustments were required to maintain service continuity and restore the impacted public rights-of-way to acceptable standards.

On motion of Mayor Pro Tempore Marc Shaw, seconded by Council Member Denise Davis, the City Council unanimously approved, by roll call vote, the First Amendment to the Public Works Construction Contract with MCC Pipeline, Inc. for the 2023 CIP Water Pipeline and Highline Replacement Project to increase the contract contingency amount by $480,000; and authorized an additional appropriation in the amount of $480,000 from Water Fund.

Vote: 5 - 0 Passed

Landscape Maintenance Services Agreement for Museum of Redlands

Facilities and Community Services Director Crocker presented the Non-Professional Services Agreement with BrightView Landscape Services, Inc. for the Museum of Redlands Landscape Maintenance services for a two-year initial term and the option to extend the initial term by one additional one-year term, on the same terms and conditions, for an amount not to exceed $125,182.

On motion of Mayor Pro Tempore Marc Shaw, seconded by Council Member Paul Barich, the City Council unanimously determined, by roll call vote, that approval of a Non-Professional Services Agreement with BrightView Landscape Services, Inc. for Museum of Redlands landscape maintenance services is exempt from the California Environmental Quality Act pursuant to Section 15301(h) of the CEQA Guidelines; and approved the Non-Professional Services Agreement with BrightView Landscape Services, Inc. for a two (2) year initial term and the option to extend the initial term by one (1) additional one-year term, on the same terms and conditions, for an amount not to exceed $125,182.

Vote: 5 - 0 Passed

Holiday Decor and Installation Services Agreement

Facilities and Community Services Department Director Crocker introduced an agreement with Southern California Lighting Inc., DBA The Christmas Kings for holiday decor and installation services for a one-year initial term and the option to extend the initial term by two additional one-year terms for the downtown area in an amount not-to-exceed $440,400.

On motion of Council Member Paul Barich, seconded by Council Member Eddie Tejeda, the City Council unanimously determined, by roll call vote, that approval of the agreement is exempt from environmental review pursuant to Section 15301(c) of the State's guidelines implementing the California Environmental Quality Act; and approved the agreement with Southern California Lighting Inc., DBA The Christmas Kings for holiday decor and installation services for the downtown area for a one (1) year initial term and the option to extend the initial term by two (2) additional one-year terms, in an amount not-to-exceed $440,400.

Vote: 5 - 0 Passed

Citrus Grove Farming Services Agreement

Facilities and Community Services Director Tabitha Crocker detailed the agreement with Larry Jacinto Farming, Inc. for as-needed Citrus Grove Farming Services of City-owned citrus groves for an amount not-to-exceed $2,316,612 for a period of up to three years. The City employs a balanced approach, using a combination of in-house staff and specialized contractual services to meet operational needs in an efficient and cost-effective manner. The proposed agreement with Larry Jacinto Farming, Inc. establishes a comprehensive scope of services necessary to sustain the City's citrus program.

On motion of Mayor Pro Tempore Marc Shaw, seconded by Mayor Mario Saucedo, the City Council unanimously determined, by roll call vote, that approval of a Non-Professional Services Agreement with Larry Jacinto Farming Inc. for as-needed Citrus Grove Farming Services is exempt from the California Environmental Quality Act pursuant to Section 15301(h) of the CEQA Guidelines; and approved the agreement with Larry Jacinto Farming, Inc. for as-needed Citrus Grove Farming Services of City-owned citrus groves for an amount not-to-exceed $2,316,612 for a period of up to three years.

Vote: 5 - 0 Passed

Resolution No. 8727 Ceasing Transfers of Solid Waste Rate Revenues to PARIS Program

Assistant City Manager Boatman provided context surrounding Resolution No. 8727 confirming solid waste rates and ceasing transfers of solid waste rate revenues to the PARIS program. In the case of Rogers v. City of Redlands, the Court ruled that the City could no longer use solid waste utility rates to fund the Pavement Accelerated Repair Implementation Strategy (PARIS), which has supported local street repair efforts. The Court's order is now final, and the City must comply by removing the PARIS transfer from its solid waste rate structure.

In September 2025, R3 prepared updates to the 2024 Rate Study to reflect new operational and regulatory information. Key adjustments reflected in the 2025 update include: 1) Eliminating the annual $1,885,248 transfer from the Solid Waste Fund to the Pavement Accelerated Repair Implementation Strategy (PARIS) beginning in FY 2025-26; 2) Updating the vehicle replacement schedule so aging units are replaced at the end of their useful lives (reversing timelines that extended beyond normal expectations in the 2024 Rate Study); 3) Costs for CARB ACF compliance, including purchase of ZEV solid waste collection vehicles and charging infrastructure, which are currently projected at roughly twice the cost of conventional internal combustion engine collection vehicles.

With the updated analysis, R3 concluded that the Council-approved adjustments for January 1, 2026, 2027 and 2028 remain necessary and appropriate to fund projected expenses and maintain minimum working reserves. If approved, this resolution will:

- Confirm compliance with the Court's order by ending the PARIS transfer from solid waste rates
- Confirm that existing rates are appropriate and necessary to fund ongoing costs
- Direct future funding toward vehicle replacement and State-mandated clean fleet requirements, rather than street repairs; and
- Ensure compliance with the Court's judgment while maintaining stable rates for customers and responsibly addressing the long-term sustainability of the solid waste utility.

As public comment, Dennis Bell was displeased this item was placed at the back of the agenda, and he thought the PARIS surcharge was based on a faulty premise that trash trucks were tearing up city streets. Instead, he thought it was due to the Council prioritizing cultural amenities over infrastructure. Stephen Rogers urged the Council to deny this resolution and what he called a short-sighted attempt to sidestep the fact that the Redlands utility rate payers have been overcharged over the last twelve years for an illegal surcharge. He thought the City should reimburse trash utility rate payers for this surcharge.

On motion of Mayor Mario Saucedo, seconded by Council Member Eddie Tejeda, the City Council adopted, by roll call vote, Resolution No. 8727 confirming solid waste rates and ceasing transfers of solid waste rate revenues to the PARIS program.

Vote: 4 - 1 Passed

NAY: Council Member Paul Barich

COUNCIL MEMBER ANNOUNCEMENTS AND ACTIVITIES

Mayor Saucedo attended the SBCTA monthly meeting, participated in the Garner Holt Public Safety Awards event, and the Chaplin luncheon at the Redlands Community Hospital. He was a part of the Dusshera Fest, highlighting Indian culture, dance and music, at Israel Beal Park, and he was honored to read to students at the Smiley Library Family Days in the Reading Room.

Mayor Pro Tem Shaw submitted his report of activities for the month of September 2025, as available online and attached to the staff report.

Council Member Barich enjoyed the Dinner at the Grove (held instead at Esri, due to rain), in support of Family Services of Redlands and attended the 14th Annual Redlands Optimist Club Oktoberfest Event at Sylvan Park.

Council Member Tejeda attended a luncheon, hosted by Assemblymember James Ramos, to celebrate the successful passage of AB 53. The bill created the first ever state tax exemption on military pensions for retirees and their survivors, enjoyed the Movies @ the Park, and represented the City at the US Bangla Association event.

Council Member Davis participated in the Annual Believe Walk event and presented a Certificate of Recognition to students at the School of Public Policy at UC Riverside.

ADJOURNMENT

There being no further action required the meeting adjourned at 7:37 P.M. The next regular meeting of the City of Redlands City Council will be held on October 21, 2025.

City Council Meeting **H. 2.**

DATE: 10/21/2025

TO: Honorable Mayor and City Council Members

SUBJECT: Adopt Resolution No. 8728 pursuant to Government Code Section 54221 declaring that certain real property located at 21 N. Church Street (APN: 071-089-13-0000) is surplus land, authorizing the City Manager, or his designee, to send notices of availability as to the surplus land, and determining that approval of the resolution is exempt from environmental review pursuant to Section 15061(b)(3) of the State's guidelines implementing the California Environmental Quality Act (Assistant City Manager Boatman)

MOTION(S):

If the City Council determines that staff's recommendation is appropriate, the following motions are provided:

1. I move that the City Council determine that adoption of Resolution No. 8728 is exempt from environmental review pursuant to Section 15061(b)(3) of the State's guidelines implementing the California Environmental Quality Act; and

2. I move to adopt Resolution No. 8728.

RECOMMENDATION:

Staff recommends that the City Council adopt Resolution No. 8728, pursuant to Government Code Section 54221 declaring that certain real property located at 21 N. Church Street (APN: 071-089-13-0000) is surplus land, and finding that such declaration is exempt from environmental review pursuant to Section 15061(b)(3) under the California Environmental Quality Act.

DISCUSSION:

The City owns property in fee located at 21 N. Church Street and as more particularly described in Exhibit A of the attached resolution (the "Property").

In an effort to address the housing crisis throughout the state, the State Legislature revamped the Surplus Land Act (SLA) in 2019 to strengthen the right of first refusal for affordable housing developers to bid on local agency-owned surplus land. The SLA requires public agencies to comply with certain procedures when disposing of real property.

The SLA requires all local agencies to prioritize affordable housing, as well as parks and open space, when disposing of surplus land. Before a local agency may dispose of land subject to the SLA, the land must be declared either surplus land or exempt surplus land, as supported by written findings. For surplus land, the City must go through a formal process to offer the land to qualifying entities and negotiate with responsive parties.

Adoption of Resolution No. 8728 would declare the Property as surplus according to the findings supporting this determination. The Resolution also includes authorization for the City Manager, or his designee, to send written notices of availability to appropriate public agencies as designated by the SLA. Recipients of the notice would then have 60 days to indicate their interest in the purchase of the surplus land. If a recipient expresses interest in purchasing the property, the City must enter into good-faith negotiations for a period of not less than 90 days. The City is not, however, required to sell the land to the interested party. If terms of sale are not agreed upon following good-faith negotiation, the land may otherwise be disposed of or sold by the City.

Approval of Resolution No. 8728 is exempt from environmental review pursuant to Section 15061(b)(3) of the State's guidelines implementing the California Environmental Quality Act (CEQA). This section states that a project is exempt from CEQA if it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment. The recommended action is consistent with this Section as it only identifies certain property as surplus and will not have a physical effect on the environment. Any future project located on the properties will be subject to the appropriate environmental review.

ALTERNATIVES:

The Council may deny this request and provide direction to staff.

STRATEGIC PLAN:

Not Applicable

SUBMITTED BY:
Christopher Boatman, Assistant City Manager

RECOMMENDED BY:
Charles M. Duggan Jr., City Manager

REVIEWED BY:
Yvette M. Abich Garcia, City Attorney
Janice McConnell, Assistant City Manager
Danielle Garcia, Management Services/Finance Director

PREPARED BY:
Tricia Swope, Manager, Facilities and Community Services

Fiscal Impact

Fiscal Year: FY 2025-26

Discussion:

There are minimal costs relative to the recommended action. Some direct costs will be incurred due to notices that must be mailed to the State, other agencies, and registered developers notifying them of the City's surplus property list. Sufficient funding for these costs are included in the Facilities and Community Services budget (101300) for Fiscal Year 2025-26 as adopted by City Council.

Attachments

A. Resolution No. 8728

B. Map of Parcel 0171-089-13

RESOLUTION NO. 8728

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF REDLANDS PURSUANT TO GOVERNMENT CODE SECTION 54221 DECLARING THAT CERTAIN REAL PROPERTY (LOCATED ON THE SOUTH WEST CORNER OF NORTH CHURCH STREET AND EAST STATE STREET IN REDLANDS, CA; APN: 0171-089-13-0000) IS SURPLUS LAND, AND FINDING THAT SUCH DECLARATION IS EXEMPT FROM ENVIRONMENTAL REVIEW UNDER THE CALIFORNIA ENVIRONMENTAL QUALITY ACT

WHEREAS, the City of Redlands (the "City") acquired property located located on the South West corner of North Church Street and East State Street in Redlands, CA; APN 0169-321-03-0000, as more particularly described in Exhibit A, attached hereto and incorporated herein by reference (the "Property"); and

WHEREAS, the City is the fee simple owner of that Property; and

WHEREAS, the Surplus Land Act, Government Code sections 54220 et seq. (the "Act") applies when a local agency disposes of "surplus land," which is defined in the Act as "land owned in fee simple by any local agency for which the local agency's governing body takes formal action in a regular public meeting declaring that the land is surplus and is not necessary for the agency's use." (Government Code section 54221(b)(1)); and

WHEREAS, under the Act, "local agency" means "every city, whether organized under general law or by charter, county, city and county, district, including school, sewer, water, utility, and local and regional park districts of any kind or class, joint powers authority, successor agency to a former redevelopment agency, housing authority, or other political subdivision of this state and any instrumentality thereof that is empowered to acquire and hold real property." (Government Code section 54221(a)(1)); and

WHEREAS, the Act requires local agencies such as the City to declare certain real property they own as either "surplus land" or "exempt surplus land," as supported by written findings, prior to any disposition of the real property; and

WHEREAS, the City Council has reviewed this Resolution and now desires to declare the Property as surplus land under the Act, based on the findings and justifications contained in this Resolution; and

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF REDLANDS AS FOLLOWS:

SECTION 1: The above recitals are true and correct and are a substantive part of this Resolution and findings of the City Council.

SECTION 2: The City Council hereby declares that the Property is no longer necessary for the City's use, and is therefore declared surplus pursuant to Government Code Section 54220 et. Seq. and based upon the following findings:

Finding: The land is surplus and is not necessary for the City's use.

Evidence: The property was purchased for potential expansion of water facilities. The property is no longer required for future expansion.

SECTION 3: This Resolution has been reviewed with respect to the applicability of the California Environmental Quality Act (Public Resources Code Section 21000 et seq.) ("CEQA"). City staff has determined that the mere designation of the Property as surplus does not have the potential for creating a significant effect on the environment and is therefore exempt from further review under CEQA pursuant to State CEQA Guidelines Section 15060(c)(3), because it is not a project as defined by the CEQA Guidelines, Section 15378. Adoption of the Resolution, in and of itself, does not have the potential for resulting in either a direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment. Nothing in this Resolution commits the City to a particular course of action with respect to the proposed transfer of exempt surplus property.

SECTION 4: The City Manager or designee is hereby authorized and directed to send a copy of this Resolution to the California Department of Housing and Community Development in accordance with the requirements of Section 400(e) of the SLA Guidelines.

SECTION 5: If any section, subsection, paragraph, sentence, clause or phrase of this Resolution is declared by a court of competent jurisdiction to be unconstitutional or otherwise invalid, such decision shall not affect the validity of the remaining portions of this Resolution.

SECTION 6: The City Clerk shall certify to the adoption of this Resolution.

PASSED, APPROVED AND ADOPTED by the City Council of the City of Redlands at a regular meeting held on the 21st day of October, 2025, by the following roll call vote:

AYES:
NOES:
ABSTAIN:
ABSENT:

_____
Mario Saucedo, Mayor

ATTEST:

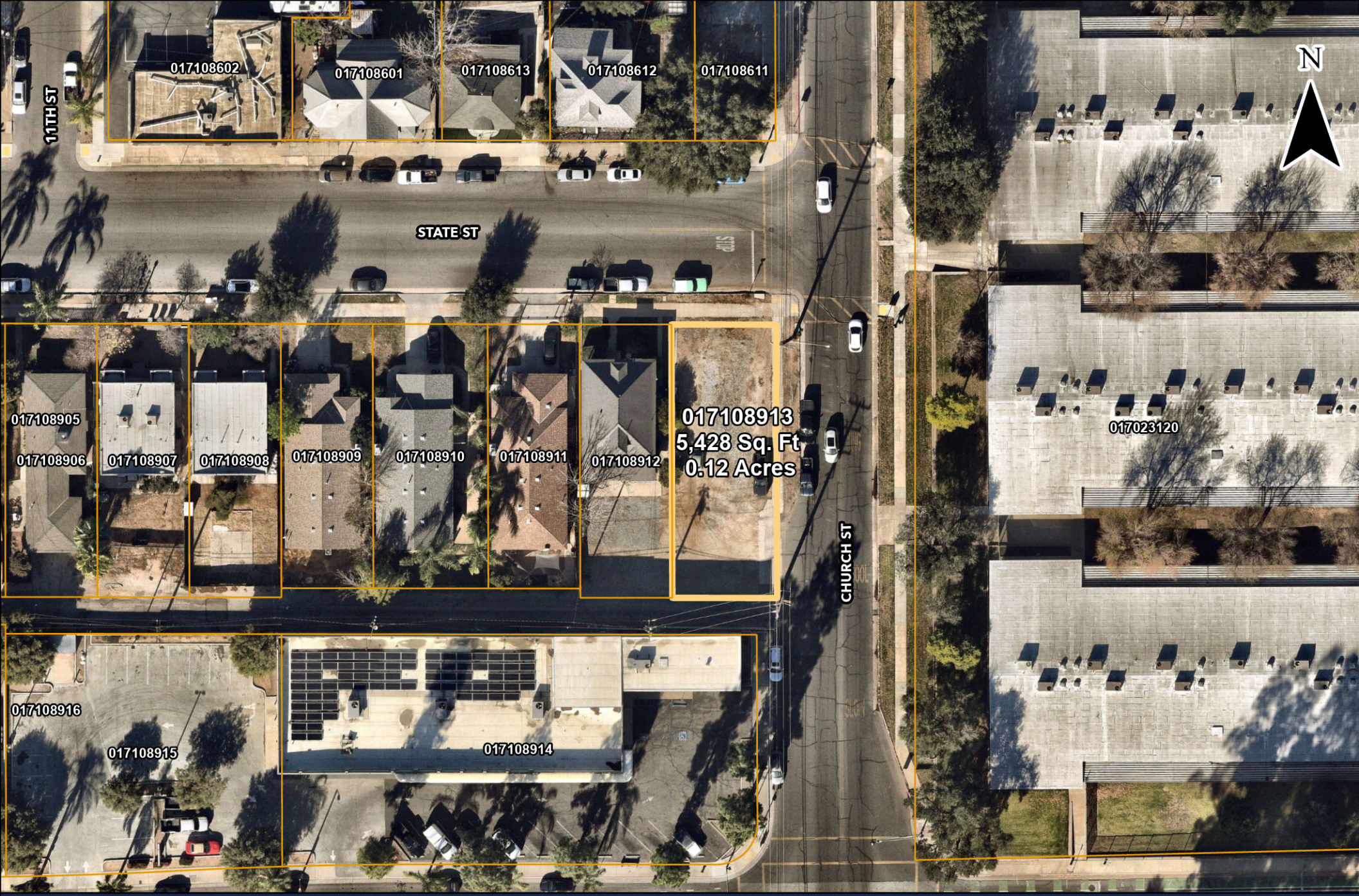
_____
Jeanne Donaldson, City Clerk

EXHIBIT A

Description of Property

APN 0171-089-13-0000

T1MMONS F1RST ADD E 45.42 FT LOT 15



APN 0171-089-13

21 N Church Street

Parcel boundaries

0 50 100 Feet

City of Redlands
Author: Redlands GIS
Date: 4/28/25

City Council Meeting **H. 3.**

DATE: 10/21/2025

TO: Honorable Mayor and City Council Members

SUBJECT: Approve Memorandum of Understanding with CAL FIRE Conservation Camp Program for the provision of labor and support on conservation, fuels management and hazard reduction projects (Fire Chief Sessler)

MOTION(S):

If the City Council determines that staff's recommendation is appropriate, the following motion is provided:

I move that the City Council approve the Memorandum of Understanding between the City of Redlands and the California Department of Forestry and Fire Protection (CAL FIRE) Conservation Camp Program for the provision of labor and support on conservation, fuels management, and hazard reduction projects.

RECOMMENDATION:

Staff recommends that the City Council approve the Memorandum of Understanding (MOU) between the City of Redlands and the California Department of Forestry and Fire Protection (CAL FIRE) Conservation Camp Program for assistance with conservation, fuels management, and hazard reduction projects throughout the city.

DISCUSSION:

The CAL FIRE Conservation Camp Program utilizes inmate or ward crews to assist with public agency conservation and hazard reduction projects. This program provides labor, supervision, transportation, food, and tools for approved projects while prioritizing emergency fire suppression activities.
The City has identified a need for support in performing conservation and fuels management projects on City-owned lands to reduce wildfire risk and maintain public safety. Participation in this program allows the City to leverage CAL FIRE

resources efficiently and cost-effectively.

The MOU establishes the responsibilities of both parties in carrying out conservation and fuels management projects. The City will submit project proposals for CAL FIRE's evaluation and is responsible for project planning, securing necessary permits, providing technical guidance, and covering project-specific costs, excluding CAL FIRE's labor, supervision, and tools. In turn, CAL FIRE will provide crews, supervision, tools, transportation, and food to complete approved projects. All improvements completed under the agreement will remain the property of the City, though CAL FIRE may place signage at project sites to acknowledge its participation. The agreement will remain in effect for two years from the effective date, unless terminated earlier by either party.

ALTERNATIVES:

The City Council may decide not to approve the MOU.

STRATEGIC PLAN:

Priority B - Public Health & Safety

SUBMITTED BY:
Rich A. Sessler, Fire Chief

RECOMMENDED BY:
Charles M. Duggan Jr., City Manager

REVIEWED BY:
Yvette M. Abich Garcia, City Attorney
Janice McConnell, Assistant City Manager
Danielle Garcia, Management Services/Finance Director

PREPARED BY:
Bruni Reyes, Management Analyst

Fiscal Impact

Fiscal Year: FY 2025-26

Revenue Generating: N

Appropriation Required Y/N: N

Discussion:

Costs to the City are limited to project-specific expenses such as materials, permits, and technical supervision. CAL FIRE covers wages, food, transportation, and tools for its crews. No additional funding appropriation is required beyond the planned project budgets.

Attachments

MOU - Conservation Camp Program

Westvalleyd3503!STATE OF CALIFORNIA
DEPARTMENT OF FORESTRY AND FIRE PROTECTION
CONSERVATION CAMP PROGRAM – MEMORANDUM OF UNDERSTANDING
FC-31 (Rev. 11/10)
MOU #_____ Master Agreement #_____

This Memorandum of Understanding (**MOU**) is made and entered into by and between the California Department of Forestry and Fire Protection (**CAL FIRE**) and _____ (**Sponsor**).

WHEREAS, CAL FIRE is authorized under Public Resources and Penal Codes to utilize inmates, or wards, assigned to conservation camps to perform the work of CAL FIRE;

WHEREAS, through contracts or cooperative agreement CAL FIRE may permit inmates, or wards to be used in the performance of conservation projects, fuels management and or hazard reduction (which could include slash and pile burning) for a public agency (local, state, or federal) or a qualified nonprofit organization under policies established by the Prison Industries Authority; and

WHEREAS, the Sponsor has a need for assistance in performing such projects,

The parties agree as follows:

A. The Sponsor shall submit project proposals on a form approved by CAL FIRE (currently an FC-32). By doing so, with reference to any such proposals subsequently approved by the CAL FIRE, Sponsor agrees to:

    1. Pay for all costs directly related to and necessitated by such projects, except for wages, salaries, and other remuneration paid to CAL FIRE employees, inmates, or wards, and the cost of their support.

    2. Demonstrate the availability of adequate plans and specifications, sufficient funds, materials, supplies, and equipment, adequate technical supervision and any special labor requirements to complete such projects.

    3. Obtain the approvals, notification, and permits required by any state, federal, or local agency necessary to commence construction, fuels management, or operation of such projects.

    4. Hold an orientation meeting with CAL FIRE at the commencement of such projects to explain the technical aspects, execution of, and need for such projects.

B. From proposals submitted by the Sponsor, CAL FIRE shall select those projects meeting the priorities and resources of CAL FIRE. CAL FIRE shall submit evaluations to Sponsor that set forth any special requirements or conditions related to the projects. By so doing, with reference to any such evaluations subsequently approved by Sponsor, CAL FIRE agrees to provide labor, crew, supervision, normal transportation, food, and such tools as CAL FIRE determines to be available. Upon receipt of Sponsor's acceptance of such evaluations, projects shall be assigned to a conservation camp where they will be scheduled in accordance with the priorities and resources of CAL FIRE.

C. Timing

    1. Sponsor recognizes that fire suppression and other emergency activities have priority over any other work for conservation camp crews.

    2. Sponsor further recognizes that the resources of CAL FIRE are limited and the public service conservation work of CAL FIRE may be altered in priority form time to time.

    3. Projects will be performed within the rules and regulations of CAL FIRE which may require temporary suspension or permanent cessation of projects due to emergency conditions as defined by such rules and regulations.

    4. The Parties agree that any justified delays by either party shall be excused and costs caused by such delays shall be borne by the party incurring such costs.

D. Work performed under this MOU will be under the immediate supervision of CAL FIRE officials. The Sponsor will provide such operation supervision, technical assistance, guidance, and inspection, as it considers necessary to properly complete the work.

E. Nothing herein shall be construed as obligating the Sponsor to expend or to obligate funds in excess of appropriations authorized by law.

F. All improvements constructed in whole or in part on lands owned or controlled by Sponsor will remain the property of Sponsor.

G. Permission to perform work on lands owned or controlled by Sponsor does not in any way convey to CAL FIRE, its staff or any persons working with CAL FIRE in the performance of said work, employee status that would extend to them the benefits afforded to permanent employees of Sponsor.

H. Upon completion of each project, or any phase thereof, permission is hereby granted to CAL FIRE to place upon the project site a sign or emblem consistent in size and design to its surroundings, indicating the participation of CAL FIRE and the year thereof.

I. Other than as indicated in Section H, neither party shall use the name of the other party in any form or manner in advertisements nor other information released to the public without the prior written approval of the other party. Sponsor may be, and CAL FIRE is, subject to the California Public Records Act. This Section I is not intended to prohibit either party from legally complying with the PRA.

J. Each party, to the extent permitted by law, agrees to indemnify and hold harmless the other party, its officers, agents and employees from all claims, demands, or liability arising out of the indemnifying party's performance under this MOU except where such injury or damage arose from the sole negligent or intentional acts or omissions of the other party.

K. Neither party may assign this MOU or any interest herein without the written consent of the other party.

L. Subject to the provisions herein, all remedies allowed by law are available to either party for enforcement of this MOU. Any waiver of rights by either party on any matter related to this MOU shall not be deemed to be a waiver on any other matter relating to the MOU.

M. All provisions of this MOU constitute essential elements of the agreed exchange that is the subject matter of this MOU. Accordingly, if any of these provisions are determined to be invalid, illegal, or unenforceable in any material respect, the remainder of this MOU is not enforceable against either of the Parties except as may be necessary to effect payment for services already rendered.

N. This MOU may be modified by mutual written agreement of the parties.

O. This MOU takes effect shall remain in effect until _____, unless terminated prior to that date by 60 days written notice from one party to the other.

IT IS AGREED:

CAL FIRE	SPONSOR _____
Date: _____	Date: _____
By: _____	By: _____
Print Name:	Print Name:
Title:	Title:
Address:	Address:

City Council Meeting **H. 4.**

DATE: 10/21/2025

TO: Honorable Mayor and City Council Members

SUBJECT: Approve Resolution No. 8729 authorizing the City Manager to approve certain workers' compensation payments and settlements. (Human Resources Director Meteau)

MOTION(S):

If the City Council determines that staff's recommendation is appropriate, the following motion is provided:

I move to adopt Resolution No. 8729 authorizing the City Manager to approve medical and workers' compensation settlement payments.

RECOMMENDATION:

Staff recommends that the City Council adopt Resolution No. 8729 authorizing the City Manager to approve medical and workers' compensation settlement payments.

DISCUSSION:

Resolution No. 8729 authorizes the City Manager, with approval of the City Attorney, to approve medical and worker's compensation settlement payments. These payments are required by law and must be issued in accordance with statutory obligations. The City is responsible for ensuring timely payment of medical expenses and stipulated settlements related to employee injury claims. Currently, the City's policies are silent on the delegation of authority to approve this category of workers' compensation payments.

Establishing clear authority for the City Manager to approve these payments will ensure compliance and provide timely support for employees receiving care under workers' compensation.

Adopting this resolution will delegate authority to the City Manager, up to an amount not to exceed Fifty Thousand Dollars ($50,000), to:

- Approve workers' compensation medical payments.
- Approve payments pursuant to stipulated settlement of workers' compensation claims.
- Approve payments pursuant to compromise and release agreements related to workers' compensation claims.

This resolution establishes a clear framework for approving workers' compensation payments, while ensuring that the City fulfills its statutory obligations.

ALTERNATIVES:
N/A

STRATEGIC PLAN:
N/A

SUBMITTED BY:
Robert Meteau Jr., Director, Human Resources/Risk Management

RECOMMENDED BY:
Charles M. Duggan Jr., City Manager

REVIEWED BY:
Yvette M. Abich Garcia, City Attorney
Janice McConnell, Assistant City Manager
Danielle Garcia, Management Services/Finance Director
Tabitha Crocker, Director, Facilities and Community Services

PREPARED BY:
Kisha McDonald, Human Resources Manager

Fiscal Impact

Discussion:
N/A

Attachments

Resolution

RESOLUTION NO. 8729

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF REDLANDS AUTHORIZING THE CITY MANAGER TO APPROVE CERTAIN WORKERS' COMPENSATION PAYMENTS AND SETTLEMENTS

WHEREAS, the City's existing policies are silent on the process and authority for approving medical and workers' compensation settlement payments; and

WHEREAS, certain workers' compensation claims that are accepted require the payment of medical bills in order to provide necessary and reasonable medical treatment to injured employees; and

WHEREAS, certain workers' compensation claims are resolved by way of stipulated settlements, whereby the City and the claimant agree to the resolution of specific issues within the claim, and payments are required to be made under such stipulated settlements; and

WHEREAS, certain workers' compensation claims are resolved by compromise and release, whereby the City and the claimant agree to a full and final settlement of the claim, and certain payments are required to be made under such compromise and release agreements; and

WHEREAS, these payments are required by law and must be made in accordance with statutory or regulatory obligations, with no discretion exercised by the City; and

WHEREAS, the authority granted by this Resolution is intended to ensure timely compliance with legal obligations and does not extend to discretionary settlements or payments beyond this specific category.

NOW, THERFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF REDLANDS AS FOLLOWS;

Section 1. The Redlands City Council hereby authorizes the City Manager, with the approval of the City Attorney, to approve the following workers' compensation payments and settlements, up to an amount not to exceed Fifty Thousand Dollars ($50,000):

a) Payment of medical bills for accepted workers' compensation claims;
b) Payments required pursuant to stipulated settlements of workers' compensation claims; and
c) Payments required pursuant to compromise and release agreements related to workers' compensation claims.

Section 2. All prior workers' compensation medical payments, required payments pursuant to stipulated settlement, and pursuant to compromise and release are hereby ratified and confirmed.

Section 3. This Resolution shall take effect immediately upon its adoption.

ADOPTED, SIGNED AND APPROVED, this 21st day of October 2025

_____
Mario Saucedo, Mayor

ATTEST:

_____
Jeanne Donaldson, City Clerk

I, Jeanne Donaldson, City Clerk of the City of Redlands, hereby certify that the foregoing resolution was duly adopted by the City Council at a regular meeting therof, held on the 21st day of October 2025.

AYES:

NOES:

ABSTAIN:

ABSENT:

_____

Jeanne Donaldson, City Clerk

City Council Meeting **H. 5.**

DATE: 10/21/2025

TO: Honorable Mayor and City Council Members

SUBJECT: Approve the First Amendment to the Agreement with Planetbids for an eProcurement System (Management Services/Finance Director Garcia)

MOTION(S):

I move to approve the first amendment to the agreement with PlanetBids system for an eProcurement system.

RECOMMENDATION:

Staff recommends that the City Council approve the first amendment to the agreement with PlanetBids for an eProcurement system.

DISCUSSION:

In February 2025, City Council approved an agreement with PlanetBids to provide an automated eProcurement system in the amount of $130,894.66 for a five-year term. Since then, the Homeless Solutions Division has been moved under the City Manager's Department. To ensure continuity, efficiency, and compliance in our procurement process, we are requesting the addition of one authorized user within the PlanetBids system. This user will support the Homeless Solutions Division by managing solicitations, vendor communications, bid evaluations, and related documentation.

Adding multiple authorized users will:

- Distribute workload across the procurement team
- Provide backup coverage during absences or high-volume periods
- Maintain segregation of duties to meet internal control and audit standards
- Enable faster response times to vendors and internal departments
- Enhance collaboration and transparency in procurement activities

With this addition, the total agreement amount for the five-year term will increase from $130,894.66 to $140,495.19.

ALTERNATIVES:

City Council may choose not to approve the First Amendment to the agreement with PlanetBids

STRATEGIC PLAN:

Not Applicable

SUBMITTED BY:
Danielle Garcia, Management Services/Finance Directo

RECOMMENDED BY:
Charles M. Duggan Jr., City Manager

REVIEWED BY:
Yvette Abich Garcia, City Attorney
Janice McConnell, Assistant City Manager

PREPARED BY:
Dana Abramovitz-Daniel, Procurement Manager

Fiscal Impact

Fiscal Year:	2026
Revenue Generating:	No
Appropriation Required Y/N:	N
Budgeted Y/N:	Y

Discussion:

The First Amendment to the PlanetBids Support Services Agreement increases the not-to-exceed (NTE) amount from $130,894.66 to $140,495.19, representing a total increase of $9,600.53 over the five-year term. The amendment adds one (1) additional Vendor and Bid Management license to support the Homeless Solutions Division.

The additional annual cost of $2,226.76 has been requested and budgeted under the Homeless Solutions Division operating budget for the current fiscal year. No additional appropriation is required, as sufficient funding exists within the approved FY2025-26 budget.

Attachments

Agreement with PlanetBids
First Amendment Planetbids

Innovative eProcurement Solutions

13263 Ventura Blvd., Suite 101 • Studio City, CA, 91604 • (818) 992–1771

PB System™ SUPPORT SERVICES AGREEMENT

What is PlanetBids. *PlanetBids provides a sustainable off-the-shelf modular suite of web-based eProcurement solutions to centralize, automate and manage the complete bidding process for goods and services. All of the solutions are interconnected, comprehensive and streamlined to help fulfill operational tasks in a timely manner, increase productivity and significantly reduce an organization's overall spend. Additional details and end User terms can be found at www.planetbids.com*

This SUPPORT SERVICES AGREEMENT ("Agreement"), which describes the terms and conditions applicable to use of the PlanetBids Online Support Services, is made and entered as of the Service Period defined below, by and between PLANETBIDS, LLC, a Delaware Limited Liability Company ("PlanetBids") and the following customer ("Customer") as described below:

Customer Name: City of Redlands (CA)

Street Address: 35 Cajon Street

City, State ZIP: Redlands CA 92373

Department: Purchasing

Principal Contact: Dana Abramovitz-Daniel

Title: Procurement Manager

Phone & Email: 19097987525; dabramovitz@cityofredlands.org

Method of Payment: Net 30 Days

Initial Service Period: 02/03/2025 - 02/02/2030

THEREFORE, PlanetBids and the Customer agree as follows:

PlanetBids Services. Upon acceptance of this Agreement, PlanetBids shall provide the following Support Services to Customer, subject to the terms and conditions of this Agreement and as more specifically described in Exhibit "A".

a. "Services" shall include one or more of the following PlanetBids PB System™ modules or features if, and only if, listed in Exhibit "A". Customer shall not have access or use of any modules or features not listed in Exhibit "A".

b. PlanetBids will market on behalf of Customer to drive Vendor engagement to participate in Customer's projects/bids as outlined in Exhibit "A".

Fees and Payments.

Support Fees. Customer agrees to pay PlanetBids set up and services fees as set forth in Exhibit "B" hereto.

a. Additional Services; Fees. If requested by Customer, PlanetBids will provide any or all of the following additional services at the fees set forth in Exhibit "B":

1. Customization work in addition to standard setup shall be contracted in the following manner and at PlanetBids' current standard rates: (a) Customer shall submit a written request describing the proposed project; (b) PlanetBids conduct a feasibility and assessment of the project and the work required, (c) if the project is technically feasible, PlanetBids will submit to Customer a written estimate setti ng forth the price, estimated schedule and any conditions of the project. PlanetBids shall not proceed until approval is received in writing from Customer.

2. Training to Customer's designated users, in addition to that provided pursuant to Section 2(a)(1), is available at rates set in Exhibit "B".

3. Customer may, during the term of this Agreement, access and retrieve data in comma delimited format and documents, at no cost. Additional Services related to the retrieval or restoration of any of Customer's data from such back-up files are available, if necessary, at rates set forth in Exhibit "B".

b. Purchase Orders/Billing. Purchase orders, billing or any related matters must be emailed to billing@planetbids.com or mailed to the following address;

PlanetBids, LLC.,13263 Ventura Blvd., Suite 101, Studio City, CA 91604

Attn: Finance or other address as specified by Company

c. Payment Terms. Net 30, Please remit the full amount within 30 days from the date of this invoice.

d. Tax. It shall be the responsibility of Customer to collect and pay any taxes, duties, imports, or tariffs that are applicable to sales via the Services.

e. Credit Cards: 3% credit card fee will be applied to all transactions made through a credit card

f. Late Fees: If Customer is overdue on any payment and fails to pay within specified payment term, then PlanetBids may assess, and Customer agrees to pay a late fee of either 1.5% per month, or the maximum amount allowable by applicable law, whichever is less.

g. Insurance: Insurance verification is provided for no cost, to be added as an "additional insured" is an additional fee as defined in Exhibit "B".

No Guarantee. PlanetBids does not guarantee use of the Services will produce any quotes, business opportunities or other information helpful to the business of Customer, nor does it guarantee that any contact provided will be adequate or best suited for any transaction.

Permitted Use. Customer shall not use, or permit any employee, consultant or other third party to use, the Services or any content or information accessible through the Services with any other e-procurement product or service including, but not limited to, use of the PB System's vendor and contractor database to distribute requests for bids through a third-party product or service.

Third Party Codes. If Customer uses standard identification codes, PlanetBids shall have the right to request for inspection an original copy of such codes and any necessary authorizations for use. If such identification codes are proprietary codes of third parties, such as NIGP, SIC or CSI, or any other third-party identification codes, it shall be the responsibility of Customer to obtain the necessary licenses. It shall not be deemed a breach of this provision if after reasonable efforts, Customer is unable to obtain the necessary licenses for third-party identification codes. Customer indemnifies and holds harmless PlanetBids from the unauthorized use or publication of any such identification codes with respect to the Services.

Data. For its own internal retrieval and restoration purposes, PlanetBids will record and maintain for a limited time a back-up of all data appearing on Customer's website on a daily basis. The standard duration of such data retained will be for a minimum of 7 years upon contract termination and determined by PlanetBids in its sole discretion thereafter. In the event PlanetBids finds it necessary to purge Customer's data file prior to the standard 7 years, Customer's data will be transmitted to Customer for Customer's record keeping purposes

Disclaimer. PLANETBIDS MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NONINFRINGEMENT OF INTELLECTUAL PROPERTY OR OTHER VIOLATION OF RIGHTS, EVEN IF PLANETBIDS HAS BEEN MADE AWARE IN ADVANCE OF SUCH POTENTIAL RISK, NOR ANY WARRANTY REGARDING THE ACCURACY, LIKELY RESULTS, OR THE RELIABILITY OF ANY SITES LINKED INTO THE SERVICES. IN NO EVENT SHALL THE AGGREGATE LIABILITY OF PLANETBIDS HEREUNDER EXCEED $1,000,000.00.

Indemnity. Each party will indemnify and defend and hold harmless the other party from and against all claims, liabilities, damages, and expenses, including reasonable attorney fees, arising out of any property damage, personal injury, or death, sustained by such other party as a result of the gross negligence or willful misconduct of the indemnifying party or its agents or employees. PlanetBids shall defend, indemnify and hold harmless Customer from any lawsuit, claim, loss, expense pr damage resulting from or caused directly or indirectly by PlanetBids' alleged violation of intellectual property rights of any third party,as it relates to the performance of PlanetBids' Statement of Work outlined in Exhibit "A" attached hereto.

Termination. a) Termination for Cause. This Agreement may be terminated by either party by providing the nonterminating party with no less than forty-five (45) business days written notice (and reasonable opportunity to cure) upon the occurrence of any breach of any material term or condition of this Agreement or any representation or warranty herein. b) Termination Other

Than for Cause. Customer may terminate this Agreement without cause by giving Company no less than sixty (60) days written notice before the effective date of such termination. In such case, the effective date of termination shall be the anniversary of the date for the current term of this Agreement that first occurs following the end of the foregoing notice period to each consecutive term year. Any payments made by Customer for actual or subsequent years are non-refundable.

Confidentiality and Non-Disclosure. To the extent authorized by law, each party to this Agreement agrees that it shall treat as confidential, information expressly marked "confidential". It shall not be a breach of this provision if Customer is required to disclose confidential information in response to a subpoena, a court order or federal or state law requires disclosure as determined by Customer. Confidential information shall not include: (i) information in the public domain through no fault of the receiving party; (ii) known to the receiving party at the time of disclosure on a non-confidential basis; (iii) rightfully obtained by the receiving party on a non-confidential basis from a third party; or (iv) independently developed by the receiving party. The parties will use confidential information (a) solely to fulfill its obligations under this Agreement; (b) protect confidential information using the same degree of care it uses to protect its own confidential information of a like nature; (c) but in no event less than a reasonable degree of care.

Notices. PlanetBids shall provide notice to Customer via email, or (at its discretion) via certified U.S. Mail, to the address provided in this Agreement or such other address provided by Customer to PlanetBids. Customer shall provide notice to PlanetBids via email to customerservice@PlanetBids.com, with a copy sent via certified U.S. Mail to the address on the membership registration. Notices will be effective 6 hours after sending if sent via email (unless the sender receives a response indicating that the message was undelivered) or 3 business days after the mailing date, whether or not received.

Assignment. Neither party shall assign this Agreement or any of its rights or obligations without the prior written consent of the other party, and any such attempted assignment will be void, provided PlanetBids may transfer this Agreement without consent of Customer in connection with the sale or transfer of all or substantially all of its equity or assets. Subject to the above, this Agreement will be binding upon the parties' respective successors and permitted assigns.

No Waiver. The failure of PlanetBids to exercise or enforce any right or provision under this Agreement will not constitute a waiver of such right or provision. If any provision of this Agreement is found by a court of competent jurisdiction to be invalid, the parties nevertheless agree that the court should endeavor to give effect to the parties' intentions as reflected in the provision, and the other provisions of the terms and conditions shall remain in full force and effect.

General. Each party to this Agreement agrees that any dispute arising under the Agreement shall first be attempted to be resolved through mediation. If mediation is unsuccessful, the parties may agree to submit the dispute to binding arbitration according to the rules and regulations of, and administered by, the American Arbitration Association, and that any award granted pursuant to such arbitration may be rendered to final judgment. Notwithstanding anything herein, either party may seek relief in any court of competent jurisdiction in San Bernardino County, California..

Force Majeure. PlanetBids will not be liable in any amount for failure to perform any obligation under this Agreement if such failure is caused by Internet outages or delays, unauthorized access (hacking), earthquakes, communications outages, fire, flood, war, an act of God, pandemic, or the occurrence of any other unforeseen contingency beyond the reasonable control of PlanetBids.

Authority to Sign. Customer represents and warrants (a) the Customer information provided is current, complete, and accurate, (b) that the person signing this Agreement is authorized to bind Customer, (c) Customer will update the information (including credit card information, if applicable) as required to keep such information current, complete and accurate. PlanetBids may, in its sole discretion, cancel or terminate this Agreement if Customer has willfully violated its obligations hereunder.

AGREED effective as of the date first written above.

PlanetBids



Signatory: David DiGiacomo

Email of signatory: davidd@planetbids.com

Timestamp: Friday, December 6th, 2024 4:17 PM UTC

City of Redlands (CA)

x _____

Signatory: Mario Saucedo, Mayor

Email of signatory: msaucedo@cityofredlands.org

Date: _____

CITY OF REDLANDS (CA)
ATTEST:

_____
Jeanne Donaldson, City Clerk

_____
Date:

EXHIBIT "A"

STATEMENT OF WORK

FOR SETUP, IMPLEMENTATION AND TRAINING

1. Customer System Configuration:

Services available to Customer shall be utilized by the Purchasing Department and shall include:

A. Access for up to nine (9) full licensed users of Customer to the following module(s) of the PlanetBids "PB System™":

i. Vendor Management and Bid Management Modules
ii. Project Evaluation Module

B. Access for up to one (1) licensed users of Customer to the following module(s) of the PlanetBids "PB System™":

i. Read-Only

C. Access and use of the PlanetBids "Outreach" database for no additional cost.

2. PB System™ Access Services:

PlanetBids rate for maintaining the PB System™ vendor and bid management is based upon an unlimited number of monthly transactions (Bids) and the number of user licenses acquired by Customer. PB System™ Access Services include the following:

- System Administration – PlanetBids will be responsible for system and data backups, disaster recovery, system reliability, availability, privacy, and system security
- Hosting Infrastructure – PlanetBids will be responsible for hosting Services, maintaining the network, hardware, and software infrastructure
- Customer Service – Is available Monday through Friday, excluding statutory holidays (see Help Desk definition below)
- Account Management – PlanetBids will provide a dedicated Account Manager for post-sales support, Services questions.

3. PB System™ Setup, Implementation and Online Training:

- Online training will be provided as outlined below for only the PB Modules licensed and purchased by the Customer for the initial setup and configuration of the Service. PB Modules which were not purchased by Customer, training will be omitted.
- PlanetBids will initially install for Customer the specified number of licensed Services users and configure PB modules.
- PlanetBids will provide up to 3 months' access, by request, to an online training sandbox for Customers to practice using the Service during the initial setup period.
- Vendor and Bid Management Modules: 2-hours and 45-minutes
- Advanced eBidding for Public Works add-on Module: 15-minutes
- PB System™ Project Evaluation Management Module: 45-minutes
- Insurance Certificate Management with My Insurance module: 30-minutes
- Contract Management Module: 45-minutes
- Includes training for DocuSign add-on to Contract Management. The DocuSign product or service is not included. Customer must purchase from DocuSign the required product or services access.
- Agency Contracts add-on Module to Contracts Management: 15-minutes
- Contract Compliance add-on module to Contract Management Module: 15-minutes
- Business Certification Module: 30-minutes
- Emergency Operations Module: 20-minute online training session

4. PB System™ setup, implementation and training consists of the following:

A. Initial program definition

The PlanetBids implementation manager will work with one (1) designated Customer project manager to develop a roadmap for system implementation. The implementation manager will define and present a project management schedule to the Customer project manager. Customer will be required to submit information according with the project management schedule. Upon completion and review of the Services by Customer, online training will be scheduled and performed.

B. System implementation and administration

PlanetBids will enter and configure Customer requirements into Services for each licensed user access for Customer for only the Modules purchased by the Customer.

The following implementation services will be provided:

a. Account Manager assigned to manage implementation process.

b. Press kit developed by PlanetBids Marketing team, including initial press release for publishing to attract Vendors to register for new system.

c. URL configured for Customer's procurement web page for Vendor registration.

d. Customer shall publish official press releases to attract Vendors to new URL. PlanetBids will publish Customer press release to social media sites and other media outlets.

e. PlanetBids will create and send an initial email campaign to any existing Vendor lists Customer may have access to or has compiled. Data will be sent to PlanetBids in comma delimited format or excel.

f. Configuration of Customer's purchased Modules.

g. Testing of Customer's purchased Modules

h. Customer specific databases will be established.

i. Complete bid management from bid submission to awarding.

j. Electronic bidding tools configured.

k. Daily backups.

l. Services users and vendor support for the duration of the Agreement.

5. Professional Services

PlanetBids will provide consulting services for custom reports or Services customizations, specific to Customer, not covered by this Statement of Work at an additional charge. Additional consulting services requested in writing by Customer will be billed at the rates set forth in Exhibit "B". No work will begin on professional services before a mutually agreed-upon statement of work is completed.

6. Help Desk

The PlanetBids Help Desk is available for support (as defined below) via our telephone number (818) 992-1771, from 8:00 am to 5:00 pm, Monday through Friday, excluding statutory holidays. Online support, as well as on-line help services are also available at https://solutions.planetBids.com/support (https://solutions.planetBids.com/support/) .

To ensure prompt assistance for licensed users of Customer's Services, PlanetBids requires the Customer to designate at least one, preferably two or three, Services Super Users. The Customer Super Users will be responsible to manage licensed user access, such as username and password, initiating or providing basic "Level 1" support to the licensed users of Customer's Services. While PlanetBids will offer Level 1 or Level 2 support, the designated Super Users will serve as the primary point of contact with PlanetBids.

To provide instant service to vendors and contractors, PlanetBids recommends Customer to initiate or provide basic "Level 1" support although PlanetBids will provide Level 1 or Level 2 support at any time:

- Level 1 support representatives will attempt to answer most or all questions, including help to vendors with simple problems (edit profile, etc.) or general "how-to" questions (search functionality, bidding, etc.). Services related questions by Vendors/Contractors that cannot be answered or supported by Customer should be directed to a PlanetBids support representative. More complex, technical questions should be directed to a Level 2 PlanetBids support representative.
- Level 2 support is more technical in nature. Level 2 questions may, for example, deal with Customer users (i.e., PB System™ administrative users including buyers, project administrators, etc.) or with password issues requiring special assistance, or with possible product bugs or failures. In this case, some research and investigation may be required.

7. User License(s) Management

Customer is responsible for monitoring and maintaining Services licensed users and ensuring all usernames and passwords are always up-to-date. Usernames and passwords are for authorized individual use only.

EXHIBIT "B"

FEES AND PAYMENTS

a. Support Fees. Customer agrees to pay PlanetBids a total of $24,730.81 for the first year. Payment for Year 1 shall be due and payable 30 days from the time of execution of this Agreement. The fee(s) for each of the following years are as outlined in Table (A) below and are payable in advance within 30 days of the first day of each such year:

1. **Setup Fee.** Customer agrees to pay a setup fee of $500 for the Services installation, configuration, and testing of the Services portal link to Customer's website, plus administrator setup and one-time online user training for up to the number of user licenses and additional modules as outlined in this Agreement and Exhibit "A".

2. **Service Fee Payment.** Customer agrees to pay for using the Services modules, a service fee of $24,230.81 for first year of this Agreement and each of the following years as outlined in Table (A). A (3%) percent fee increase applies upon renewal each year.

Table (A)

PB System™ MODULES	Quantity Up to	SETUP	2025-2026	2026-2027	2027-2028	2028-2029	2029-2030
Vendor Management & Bid Management	9	-	20,040.81	20,642.03	21,261.30	21,899.13	22,556.11
Project Evaluation Management	9	500.00	3,675.00	3,785.25	3,898.81	4,015.77	4,136.24
Read-Only	1	-	515.00	530.45	546.36	562.75	579.64
Sub-Total		**$500.00**	**$24,230.81**	**$24,957.73**	**$25,706.47**	**$26,477.66**	**$27,271.99**
Total			**$24,730.81**	**$24,957.73**	**$25,706.47**	**$26,477.66**	**$27,271.99**

b. Additional Services. If requested by Customer in writing, PlanetBids will provide any or all of the following additional services. The following rates are current as of the date of this Agreement but are subject to an increase of not more than 10% per year after the first year of this Agreement.

1. Training: $975.00, for a single online training session of up to 2 hours.

2. For its own internal retrieval and restoration purposes, PlanetBids will record and maintain for a limited time a back-up of all data appearing on Customer's website on a daily basis. The duration of such data retained will be for a minimum of 7 years and determined by PlanetBids in its sole discretion thereafter. However, Customer may, during the term of this Agreement, access and retrieve data in text delimited Microsoft Excel format and documents, at no cost. Additional Services related to the retrieval or restoration any of Customer's data from such back-up files are available, if necessary, at PlanetBids current standard rates, which will vary depending on the level of services required, but not less than $250.00 per hour.

3. Customer to be added as an "Additional Insured" is $250/year.

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Amendment No.1
PB System™ - Support Services
Agreement Dated October 21, 2025

1. Standard Provisions

Under the PB System™ Support Services Agreement and any previous amendments thereto (referred to herein as "Agreement") between PlanetBids, LLC (PlanetBids) and the **City of Redlands, CA** (referred herein as "Customer") PlanetBids shall remain bound to the terms of the Agreement, except to the extent the terms of this Amendment conflict with the Agreement or a previous amendment, in which case this Amendment shall supersede. Nothing in this Amendment relieves PlanetBids of its obligation to perform as required by the Agreement or any previous amendment unless expressly stated herein.

2. Agreement Revisions

A. Scope of Work

PlanetBids and Customer agree that Section 1 of Exhibit "A" to the PlanetBids Support Services Agreement shall be amended as summarized in Revision 1 herein.

Revision 1:
As of October 21, 2025, PlanetBids and Customer has agreed to:
a) Add one (1) Additional Vendor and Bid Management License to the PB System™

B. Costs

PlanetBids and Customer agree that Fees and Payments, of Exhibit "B" to the PlanetBids Support Services Agreement shall be amended as summarized in Revision 2 herein.

Revision 2:

a) That the prorated fees for Year 1 and fees for Years 2 through 5 are amended as outlined in Table (A) below. A yearly fee escalation of three (3) percent applies.

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Table (A)

2025 New Agreement Cost Adding 1 Full Additional User License

PB System™ MODULES	Quantity Up to	2025-2026 *One add'l prorated license included*	2026-2027	2027-2028	2028-2029	2029-2030
Vendor Management & Bid Management	10	21,669.70	22,935.59	23,623.66	24,332.37	25,062.34
Project Evaluation Management	10	3,675.00	3,675.00	3,785.25	3,898.81	4,015.77
Read-Only	1	515.00	515.00	530.45	546.36	562.75
Setup		500.00				
Sub-Total		$26,359.70	**$27,125.59**	**$27,939.36**	**$28,777.54**	**$29,640.87**
Total		**$25,761.83**	**$27,125.59**	**$27,939.36**	**$28,777.54**	**$29,640.87**

C. Schedule of Services/Milestones/Deliverables

PlanetBids and Customer agree that there shall be no change to the term(s) of the Agreement and billing cycle.

3. Signatures

This Amendment may be executed and delivered by electronic or facsimile signature and an electronic or facsimile signature shall be treated as an original.

IN WITNESS WHEREOF, This Amendment has been executed under the provisions of the Agreement between PlanetBids and Customer. By signing below, the parties hereto agree that all terms and conditions of this Amendment and the Agreement and any previous amendments shall be in full force and effect.

The persons below assert that they are authorized to execute this Amendment.

PLANETBIDS, LLC

By:_____
David DiGiacomo, CEO

City of Redlands, CA

By:

_____
Name:
Title:_____

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City Council Meeting **H. 6.**

DATE: 10/21/2025

TO: Honorable Mayor and City Council Members

SUBJECT: Approve a Sole Source Procurement Waiver and Professional Services Agreement with CDM Smith Inc. to provide construction engineering support services for the construction phase of the Joint Utilities Laboratory Building Renovation and Expansion Project Phase 1, and bidding support services for Phase 2 of this project for an amount not-to-exceed $155,420 and determine that this action is exempt from environmental review pursuant to Section 15061(b)(3) of the State's guidelines implementing the California Environmental Quality Act (Municipal Utilities and Engineering Director Harris)

MOTION(S):

If City Council determines the staff recommendation is appropriate, the following motions are provided:

1. I move that City Council determine approval of a Professional Services Agreement with CDM Smith Inc. is exempt from environmental review pursuant to Section 15061(b)(3) of the State's guidelines implementing the California Environmental Quality Act;

2. I move City Council approval to waive competitive procurement procedures and award a $155,420 Professional Services Agreement to CDM Smith Inc. for construction engineering support services for the construction phase of the Joint Utilities Laboratory Building Renovation and Expansion Project Phase 1, and bidding support services for Phase 2 of this project.

RECOMMENDATION:

Staff recommends that City Council determine that approval of the Professional Services Agreement with CDM Smith Inc. to provide construction engineering support services for the construction phase of the Joint Utilities Laboratory Building Renovation and Expansion Project Phase 1, and bidding support services for Phase 2 is exempt from environmental review pursuant to Section

15061(b)(3) of the State's guidelines implementing the California Environmental Quality Act, waive the competitive procurement process, and approve a Professional Services Agreement with CDM Smith Inc. for an amount non-to-exceed $155,420.

DISCUSSION:

The Joint Utilities Laboratory (JUL) is an Environmental Laboratory Accreditation Program (ELAP) certified facility responsible for analyzing the City's water, wastewater, and biosolids to ensure compliance with regulatory standards and to safeguard public health. The facility was originally constructed in 1988 and has not been upgraded or expanded, even as regulatory agency-mandated testing requirements have substantially increased. The laboratory continues to operate with its original fixtures, furnishings, and infrastructure, and now needs to be expanded and modernized to meet current and future operational demands.

On June 18, 2024, the City Council approved a Professional Services Agreement with CDM Smith, Inc. (CDM Smith) to design the Joint Utilities Laboratory Building Renovation and Expansion Project (Project). CDM Smith completed the final design, which will be implemented in two (2) phases. Phase 1 involves an expansion of the building footprint by approximately 1,990 square feet. Municipal Utilities and Engineering Department (MUED) staff, in collaboration with CDM Smith, developed the Phase 1 scope of services and solicited competitive bids and received responses from eleven (11) contractors on September 9, 2025. City Council will consider the MUED staff construction contract award recommendation separately.

As the Engineer/Architect of record, CDM Smith must provide limited specialized engineering support services to ensure the Project is constructed in substantial conformance with the plans and specifications. These services include reviewing and approving submittals, preparing construction-related documents, clarifying plans and specifications, and providing limited, on-site technical support during construction. To reduce the risk of design conflicts and minimize City liability, MUED staff recommends waiving the competitive procurement process and contracting directly with CDM Smith, Inc. for these services. Following the completion of Phase 1 construction, CDM Smith will also prepare the bid package and provide bidding support for Phase 2 of the Project. Staff has negotiated a professional services fee of $155,420 with CDM Smith to perform these tasks.

Approval of this Agreement is exempt from environmental review pursuant to Section 15061(b)(3) of the State's guidelines implementing the California Environmental Quality Act, as the proposed action does not have the potential to cause any significant environmental impact.

ALTERNATIVES:

City Council may deny the staff recommendation and provide alternate direction.

STRATEGIC PLAN:

N/A

SUBMITTED BY:
John R. Harris, Municipal Utilities and Engineering Director

RECOMMENDED BY:
Charles M. Duggan Jr., City Manager

REVIEWED BY:
Yvette M. Abich Garcia, City Attorney
Janice McConnell, Assistant City Manager
Danielle Garcia, Management Services/Finance Director
Dana Abramovitz-Daniel, Procurement Manager

PREPARED BY:
Goutam K. Dobey, City Engineer

Fiscal Impact

Fiscal Year:	FY 25/26
Appropriation Required Y/N:	N
Budgeted Y/N:	Y
Account No.:	501910 & 521910

Discussion:

There is no fiscal impact associated with this action. Sufficient funding for this project is included in the Fiscal Year 25/26 Water Projects (501910) and Wastewater Projects (521910) Budget.

Attachments

CDM Professional Services Agreement

AGREEMENT TO PERFORM PROFESSIONAL SERVICES

This agreement for the provision of Construction Support Service for Phase 1 and Bidding Support Services for Phase 2 of the Joint Utilities Laboratory Building Renovation & Expansion Project ("Agreement") is made and entered in this 21st day of October, 2025 ("Effective Date"), by and between the City of Redlands, a municipal corporation ("City") and CDM Smith, Inc., a Massachusetts corporation ("Consultant"). City and Consultant are sometimes individually referred to herein as a "Party" and, together, as the "Parties." In consideration of the mutual promises contained herein, City and Consultant agree as follows:

ARTICLE 1 – ENGAGEMENT OF CONSULTANT

1.1 City hereby engages Consultant to provide Construction Support Service for Phase 1 and Bidding Support Services for Phase 2 of the Joint Utilities Laboratory Building Renovation & Expansion Project services for City (the "Services").

1.2 The Services shall be performed by Consultant in a professional manner, and Consultant represents that it has the skill and the professional expertise necessary to provide the Services to City at a level of competency presently maintained by other practicing professional consultants in the industry providing like and similar types of Services.

ARTICLE 2 – SERVICES OF CONSULTANT

2.1 The Services that Consultant shall perform are more particularly described in Exhibit "A," titled "Scope of Services," which is attached hereto and incorporated herein by this reference.

2.2 Consultant shall comply with applicable federal, state and local laws and regulations in the performance of this Agreement including, but not limited to, any applicable State prevailing wage laws.

ARTICLE 3 – RESPONSIBILITIES OF CITY

3.1 City designates John R. Harris, Municipal Utilities and Engineering Department Director, as City's representative with respect to performance of the Services, and such person shall have the authority to transmit instructions, receive information, interpret and define City's policies and decisions with respect to performance of the Services.

ARTICLE 4 – PERFORMANCE OF SERVICES

4.1 Consultant shall complete the Services by June 30, 2027, unless the Services are terminated earlier as provided for herein.

4.2 If Consultant's Services include deliverable electronic visual presentation materials, such materials shall be delivered in a form, and made available to City, consistent with City Council-adopted policy for the same. It shall be the obligation of Consultant to obtain a copy of such policy from City staff.

ARTICLE 5 – PAYMENTS TO CONSULTANT

5.1 Total compensation for Consultant's performance of the Services shall not exceed the amount of one hundred fifty-five thousand four hundred twenty dollars ($155,420). City shall pay Consultant on a time and materials basis up to the not to exceed amount in accordance with Exhibit "B," titled ("Fee Proposal") which is attached hereto and incorporated herein by reference.

5.2 Consultant shall submit monthly invoices to City describing the Services performed during the preceding month. Consultant's invoices shall include a brief description of the Services performed, the dates the Services were performed, the number of hours spent and by whom, and a description of reimbursable expenses related to the Services. City shall pay Consultant no later than thirty (30) days after receipt and approval by City of Consultant's invoice.

5.3 Any notice or other communication required, or which may be given, pursuant to this Agreement, shall be in writing. Any such notice shall be deemed delivered (i) on the date of delivery in person; (ii) five (5) days after deposit in first class registered mail, with return receipt requested; (iii) on the actual delivery date if deposited with an overnight courier; or (iv) on the date sent by facsimile or electronic mail transmission (including PDF), if confirmed with a copy sent contemporaneously by first class, certified, registered or express mail; in each case properly posted and fully prepaid to the appropriate address set forth below, or such other address as a Party may provide notice in accordance with this section:

CITY:	CONSULTANT:
City Clerk	Alberto Acevedo, Vice President
City of Redlands	CDM Smith, Inc.
35 Cajon Street	32 Discovery, Suite 250
P.O. Box 3005 (mailing)	Irvine, CA 92618
Redlands, CA 92373	Email: acevedoa@cdmsmith.com
jdonaldson@cityofredlands.org	Phone: (949) 930-7252
Phone: (909) 798-7531	Fax: (949) 515-9160

ARTICLE 6 – INSURANCE AND INDEMNIFICATION

6.1 The following insurance coverage required by this Agreement shall be maintained by Consultant for the duration of its performance of the Services. Consultant shall not perform any Services unless and until the required insurance listed below is obtained by Consultant. Consultant shall provide City with certificates of insurance and endorsements

evidencing such insurance prior to commencement of the Services. Insurance policies shall include a provision prohibiting cancellation or modification of the policy except upon thirty (30) days prior written notice to City.

A. Workers' Compensation and Employer's Liability insurance in the amount that meets statutory requirements with an insurance carrier acceptable to City, or certification to City that Consultant is self-insured or exempt from the workers' compensation laws of the State of California. Consultant shall execute and provide City with Exhibit "C," titled "Workers' Compensation Insurance Certification," which is attached hereto and incorporated herein by this reference, prior to performance of the Services.

B. Comprehensive General Liability insurance with carriers acceptable to City in the minimum amount of One Million Dollars ($1,000,000) per occurrence and Two Million Dollars ($2,000,000) aggregate, for public liability, property damage and personal injury is required. City shall be named as an additional insured and such insurance shall be primary and non-contributing to any insurance or self-insurance maintained by City.

C. Consultant shall secure and maintain professional liability insurance throughout the term of this Agreement in the amount of One Million Dollars ($1,000,000) per claim made.

D. Business Auto Liability coverage, with minimum limits of One Million Dollars ($1,000,000) per occurrence, combined single limit bodily injury liability and property damage liability. This coverage shall include all Consultant owned vehicles used in connection with Consultant's provision of the Services, hired and non-owned vehicles, and employee non-ownership vehicles. City shall be named as an additional insured and such insurance shall be primary and non-contributing to any insurance or self-insurance maintained by City.

E. Consultant is expressly prohibited from assigning or subcontracting any of the Services without the prior written consent of City. In the event of mutual agreement by the Parties to assign or subcontract a portion of the Services, Consultant shall add such assignee or subcontractor as an additional insured to the insurance policies required hereby and provide City with the insurance endorsements prior to any Services being performed by the assignee or subcontractor.

6.2 Consultant shall defend, indemnify and hold harmless City and its elected and appointed officials, employees and agents from and against any and all claims, losses or liability, including attorneys' fees, arising from injury or death to persons or damage to property occasioned by any negligent act or omission by, or the willful misconduct of, Consultant, or its officers, employees and agents in performing the Services.

ARTICLE 7 – CONFLICTS OF INTEREST

7.1 Consultant covenants and represents that it does not have any investment or interest in any real property that may be the subject of this Agreement or any other source of income, interest in real property or investment that would be affected in any manner or degree by the performance of Consultant's Services. Consultant further covenants and represents that in the performance of its duties hereunder, no person having any such interest shall perform any Services under this Agreement.

7.2 Consultant agrees it is not a designated employee within the meaning of the Political Reform Act because Consultant:

A. Does not make a governmental decision whether to:

(i) approve a rate, rule or regulation, or adopt or enforce a City law;
(ii) issue, deny, suspend or revoke any City permit, license, application, certification, approval, order or similar authorization or entitlement;
(iii) authorize City to enter into, modify or renew a contract;
(iv) grant City approval to a contract that requires City approval and to which City is a party, or to the specifications for such a contract;
(v) grant City approval to a plan, design, report, study or similar item;
(vi) adopt, or grant City approval of, policies, standards or guidelines for City or for any subdivision thereof.

B. Does not serve in a staff capacity with City and in that capacity, participate in making a governmental decision or otherwise perform the same or substantially the same duties for City that would otherwise be performed by an individual holding a position specified in City's Conflict of Interest Code under Government Code section 87302.

7.3 In the event City determines that Consultant must disclose its financial interests, Consultant shall complete and file a Fair Political Practices Commission Form 700, Statement of Economic Interests, with the City Clerk's office pursuant to the written instructions provided by the City Clerk.

ARTICLE 8 – GENERAL CONSIDERATIONS

8.1 In the event any action is commenced to enforce or interpret any of the terms or conditions of this Agreement the prevailing Party shall, in addition to any costs and other relief, be entitled to the recovery of its reasonable attorneys' fees, including fees for the use of in-house counsel by a Party.

8.2 Consultant shall not assign any of the Services, except with the prior written approval of City and in strict compliance with the terms and conditions of this Agreement. Any assignment or attempted assignment without such prior written consent may, in the sole discretion of City, result in City's immediate termination of this Agreement.

8.3 Consultant is for all purposes under this Agreement an independent contractor and shall perform the Services as an independent contractor. Neither City nor any its agents shall have control over the conduct of Consultant or Consultant's employees, except as herein set forth. Consultant shall supply all necessary tools and instrumentalities required to perform the Services. Assigned personnel employed by Consultant are for its account only, and in no event shall Consultant or personnel retained by it be deemed to have been employed by City or engaged by City for the account of, or on behalf of City. Consultant shall have no authority, express or implied, to act on behalf of City in any capacity whatsoever as an agent, nor shall Consultant have any authority, express or implied, to bind City to any obligation.

8.4 This Agreement may be terminated by City, in its sole discretion, by providing not less than five (5) days prior written notice to Consultant of City's intent to terminate. If this Agreement is terminated by City, an adjustment to Consultant's compensation shall be made, but (1) no amount shall be allowed for anticipated profit or unperformed Services, and (2) any payment due Consultant at the time of termination may be adjusted to the extent of any additional costs to City occasioned by any default by Consultant. Upon receipt of a termination notice, Consultant shall immediately discontinue its provision of the Services and, within five (5) days of the date of the termination notice, deliver or otherwise make available to City, copies (in both hard copy and electronic form, where applicable) of project related data, design calculations, drawings, specifications, reports, estimates, summaries and such other information and materials as may have been accumulated by Consultant in performing the Services. Consultant shall be compensated on a pro-rata basis for Services completed up to the date of termination.

8.5 Consultant shall maintain books, ledgers, invoices, accounts and other records and documents evidencing costs and expenses related to the Services for a period of three (3) years, or for any longer period required by law, from the date of final payment to Consultant pursuant to this Agreement. Such books shall be available at reasonable times for examination by City at the office of Consultant.

8.6 This Agreement, including the Exhibits incorporated herein by reference, represents the entire agreement and understanding between the Parties as to the matters contained herein, and any prior negotiations, written proposals or verbal agreements relating to such matters are superseded by this Agreement. Except as otherwise provided for herein, any amendment to this Agreement shall be in writing, approved by City and signed by City and Consultant.

8.7 This Agreement shall be governed by and construed in accordance with the laws of the State of California, without regard to its conflicts of laws provisions. The Parties agree that all actions or proceedings arising in connection with this Agreement shall be tried and litigated only in the state courts located in San Bernardino County, California, and the federal courts located in Riverside County, California.

8.8 If one or more of the sentences, clauses, paragraphs or sections contained in this Agreement is declared invalid, void or unenforceable by a court of competent jurisdiction, the same shall be deemed severable from the remainder of this Agreement and shall not affect, impair or invalidate the remaining sentences, clauses, paragraphs or sections contained herein, unless to do so would deprive a Party of a material benefit of its bargain under this Agreement.

IN WITNESS WHEREOF, duly authorized representatives of City and Consultant have signed in confirmation of this Agreement.

CITY OF REDLANDS

By: _____
Mario Saucedo Mayor

CDM SMITH, INC.

By: _____
Alberto Acevedo, Vice President

ATTEST:

_____
Jeanne Donaldson, City Clerk

EXHIBIT "A"

SCOPE OF SERVICES

Consultant will provide construction support services for phase 1 and bid support services for phase 2 of the Joint Utilities Laboratory Building Renovation & Expansion Project. The following scope of work outlines the tasks to be completed by the Consultant.

Task 1.0 – Engineering Services During Construction for Phase 1

Under Task 1.0 Consultant will provide Project Management, submittal and shop drawing review, review and respond to Contractor's Requests for Information (RFIs), provide field support and attend meetings. Below is a detailed description of these services.

Task 1.1 – Project Management

Consultant will manage the Joint Laboratory Building Renovation and Expansion scope and budget including engineering services workflow. Consultant will prepare monthly invoices and project status reports that summarize budget, any onsite activities, and number of submittals and RFIs reviewed. Consultant will also maintain internal submittals and RFIs logs to track review progress.

Task 1.2 – Submittal and Shop Drawing Reviews

Consultant will review technical submittals for conformance to the project documents. Technical submittals will be reviewed by Consultant's multi-discipline design team as defined in Section 01330. A comment form will be generated indicating disposition (No Exceptions, Exceptions Noted, Returned for Correction, Not Acceptable). The City will receive transmittals and verify completion of all submittals, returning incomplete or improper submittals to the Contractor. Complete and compliant submittals will be provided to Consultant design team electronically for review by appropriate disciplines. Consultant has budgeted for an average of 1.5 reviews (one submittal + one re-submittal) per technical submittal. Items that require more than two reviews due to Contractor's failure to provide adequate or complete information will be reviewed and time tracked so that the City can recover costs as defined in Section 01330 of the Specifications.

Procedural and administrative submittals (e.g., schedule of values, payment applications, schedule updates, contractual documents, etc.) are assumed to be handled by the City. The City will receive, file, and update the submittal log accordingly.

Consultant has assumed 60 original technical submittals submitted by the Contractor.

Task 1.3 – Requests for Information

Consultant will review and provide responses to City for Contractor-initiated RFIs. Based on the project scope/scale and complexity, we anticipate 38 RFIs.

Task 1.4 – Field Support, Site Visits, Construction Observations, and Meetings

Consultant's Architect of Record (Richard Chong), our local design team representative, and/or appropriate design discipline leads will conduct site visits, participate in onsite meetings, provide architectural/engineering oversight, as required and at the request of the City or its designated representative. For budgeting purposes, we have assumed the following efforts:

Attendance at onsite pre-construction meeting by Brian Leto.

Attendance at preparatory meetings for civil work – if required by the City, we assumed one (1) onsite meeting.

Attendance at preparatory meetings for structural work – if required by the City - assumed one (1) onsite meeting.

Up to two (2) site visits, as requested by the City, for the Architect of Record.

Up to three (3) site visits for our Structural Engineer to conduct construction observations as required by the City.

Attendance at one virtual construction progress meeting per month by our designated Design Team Representative.

Management and Specialty Leaders Participation in up to six (6) virtual Meetings @ 1 hour each.

Up to three (3) special virtual meetings to resolve field issues or other project matters.

Task 2.0 – Bid Support Services for Phase 2

Task 2.1 – Project Management

Under this Task Consultant will manage the preparation of the Bid documents for Joint Laboratory Building Renovation and Expansion Phase 2. Consultant will provide onsite and office-based activities as described below.

Task 2.2 – Preparation of Bid Documents

This Task will involve supporting the City in the preparation of a Bid package for Phase 2. Consultant will update the drawings and specifications based on construction completed in Phase 1. prepare the "Bid Schedule" and mark the updated drawings and specification sections to identify those drawings and specifications that will be used under Phase 2.

Assumptions:

Work will be completed within four (4) weeks.

Consultant 100% design documents affected by Phase 1 construction will be updated and become the basis for preparation of the Phase 2 bid package.

Deliverables:

Construction Bid Schedule for Phase 2

List of drawings to be used in Phase 2

List of specifications for Phase 2

Task 2.3 – Pre-Bid Meeting

Consultant Principal, Project Manager and Lead Architect (virtual) will attend the pre-bid meeting to provide an overview of the project and field questions from potential contractors. Contractors will be directed to submit questions that cannot be easily referred to the contract documents through the bid questions process.

Assumptions:

The principal, project manager and lead architect (Architect of record) will attend the pre-bid meeting for up to four hours each.

Deliverables:

Meeting notes

Task 2.4 Engineering Support during Bid Phase

Consultant will provide support services during the bid phase period to provide response to any questions or clarifications requested by potential contractors.

Assumptions:

Response to ten (10) Requests for Clarification (RFCs) from potential bidders

Assist the City with preparation of up to two (2) addendums

Deliverables:

Response to 10 RFCs

Two (2) addendums

Identify potential cost impacts associated with addenda changes

Task 2.5 – Conformed Document Preparation

Within two (2) weeks after the Award recommendation Consultant will prepare a conformed documents set (drawings, specifications and other required material) that incorporates the addenda during the bid phase. These documents will be ready for the selected contractor to begin work immediately after Notice to Proceed (NTP).

Deliverables:

Conformed Documents for Construction

EXHIBIT "B"
FEE PROPOSAL

Task	WBS/Activity Name	Amount
1.0	**Phase 1 Engineering Support During Construction**	
1.1	Project Management	$18,380
1.2	Submittal and Shop Drawing Reviews	$56,870
1.3	Requests for Information	$22,545
1.4	Field Support, Site Visits, Construction Observations, and Meetings	$24,350
2.0	**Phase 2 Bid Support Services**	
2.1	Project Management	$1,665
2.2	Preparation of Bid Documents	$13,325
2.3	Pre-Bid Meeting	$2,180
2.4	Engineering Support During Bid Phase	$7,660
2.5	Conformed Document Preparation	$8,445
	TOTAL	**$155,420**

EXHIBIT "C"

WORKERS' COMPENSATION INSURANCE CERTIFICATION

Every employer, except the State, shall secure the payment of compensation in one or more of the following ways:

(a) By being insured against liability to pay compensation by one or more insurers duly authorized to write compensation insurance in this State.

(b) By securing from the Director of Industrial Relations, a certificate of consent to self-insure, either as an individual employer, or as one employer in a group of employers, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his or her employees.

CHECK ONE

_____I am aware of the provisions of Section 3700 of the Labor Code which requires every employer to be insured against liability for Workers' Compensation or to undertake self-insurance in accordance with the provisions of that Code, and I will comply with such provisions before commencing the performance of the work and activities required or permitted under this Agreement. (Labor Code §1861).

_____I affirm that at all times, in performing the work and activities required or permitted under this Agreement, I shall not employ any person in any manner such that I become subject to the workers' compensation laws of California. However, at any time, if I employ any person such that I become subject to the workers' compensation laws of California, immediately I shall provide the City with a certificate of consent to self-insure, or a certification of workers' compensation insurance.

I certify under penalty of perjury under the laws of the State of California that the information and representations made in this certificate are true and correct.

CDM SMITH, INC.

By:_____ Date: _____
Alberto Acevedo, Vice President

City Council Meeting **H. 7.**

DATE: 10/21/2025

TO: Honorable Mayor and City Council Members

SUBJECT: Approve the use of city resources and the request for in-kind support in the amount of $53,140.71 related to the Redlands Christmas Parade event hosted by the Kiwanis Club on December 6, 2025; approve temporary street closures related to the event; and determine that the event is categorically exempt from environmental review pursuant to Section 15311 (c) of the State's guidelines implementing the California Environmental Quality Act (Facilities and Community Services Director Crocker)

MOTION(S):

If the City Council determines that staff's recommendations are appropriate, the following motions are provided:

1. I move that the City Council determine that the approval of the event is exempt from environmental review pursuant to Section 15311(c) of the State's guidelines implementing the California Environmental Quality Act; and
2. I move to authorize and approve a request for in-kind support in the amount of $53,140.71 and the temporary street closures related to the event.

RECOMMENDATION:

Staff recommends that the City Council determine that authorization for the items associated with the Kiwanis Christmas Parade, scheduled on December 6, 2025, is exempt from environmental review pursuant to Section 15311(c) of the State's guidelines implementing the California Environmental Quality Act (CEQA). Staff further recommends that the City Council direct staff accordingly regarding the temporary street closures outlined in the staff report and the expenditure of city resources and in-kind support in the amount of $53,140.71, including costs for personnel, equipment, and related services.

DISCUSSION:

The Facilities and Community Services Department manages the administration and issuance of permits for special events held in public areas of the city. Upon the issuance of a special event permit, the event may take place contingent on the event organizer paying the required fees. The City recognizes the value of partnering with non-profit agencies and organizations to provide services beneficial to the community. In an effort to support programs that provide a community benefit, the City Council will, from time to time, consider the authorization of in-kind support including the use of city equipment, staff, and facilities for special events.

The Kiwanis Club of Redlands has requested the use of the downtown area for their annual Christmas Parade event to be held on December 6, 2025, from 6:00 p.m. to 9:00 p.m. with a rain-out date of December 13, 2025. The Kiwanis Club is requesting in-kind support and departmental resources, including personnel, services and equipment in the amount of $53,140.71 for this year's event. The group is requesting temporary street closures between 2:00 p.m. and 10:00 p.m. Affected streets include Brookside/Citrus Avenue from Center Street to Olive Avenue, State Street from Orange Street to 8th Street, Orange Street from Redlands Blvd to Vine Street, Eureka Street from Olive Avenue to Redlands Blvd.

Per the application submitted, the Kiwanis Club, a long-standing registered non-profit organization in the City of Redlands, has been a cornerstone of community engagement since 1990 through its annual Kiwanis Christmas Parade. This year’s event, as outlined in the submitted application, is projected to attract an estimated 25,000 attendees to the downtown area, emphasizing its growing popularity and local impact to the community. Previously in 2024, the City supported this event by providing in-kind contributions, with the most recent allocation totaling $37,286.72.

The event is exempt from the requirements of the California Environmental Quality Act’s guidelines pursuant to Section 15311(c). Section 15311(c), accessory structures Class 11 facilities, consists of construction, or replacement of minor structure accessory to existing commercial, industrial, or institutional facilities, including placement of seasonal or temporary use items such as mobile food units, portable restrooms or similar items in generally the same locations from time to time in publicly owned parks or other facilities designed for public use.

ALTERNATIVES:

The City Council may elect to deny the request for in-kind support, deny the request for temporary street closure and direct staff accordingly.

STRATEGIC PLAN:

Priority A - Quality of Life, Beautification, Arts and Culture.

SUBMITTED BY:
Tabitha Crocker, Facilities and Community Services Department Director

RECOMMENDED BY:
Charles M. Duggan Jr., City Manager

REVIEWED BY:
Christopher Boatman, Assistant City Manager
Janice McConnell, Assistant City Manager
Danielle Garcia, Management Services/Finance Director

PREPARED BY:
Jaclyn Ramirez, Administrative Assistant II

Fiscal Impact

Fiscal Year:	2025/26
Revenue Generating:	Y
Appropriation Required Y/N:	N
Amount:	$53,140.71
Budgeted Y/N:	N
Discussion:	

Please see the "Fiscal Impact" attachment for reference.

The event is exempt from the requirements of the California Environmental Quality Act’s guidelines pursuant to Section 15311(c). Section 15311(c), accessory structures Class 11, consists of construction, or replacement of minor structure accessory to existing commercial, industrial, or institutional facilities, including placement of seasonal or temporary use items such as mobile food units, portable restrooms or similar items in generally the same locations from time to time in publicly owned parks or other facilities designed for public use.

Attachments

In-Kind Request
Event Map
Verification of Non-Profit
Street Closure Permit
Fiscal Impact

City of Redlands *In-Kind Support Request*

Event Name: Kiwanis Christmas Parade

Event Date(s): Dec. 06, 2025 **Location(s):** Downtown Redlands

Rain Out Date: Dec. 13, 2025 **Beginning Time:** 3 PM **End Time:** 9 PM

Describe Your Request:

This completed form with all supporting documentation shall be submitted a minimum of 60 days prior to the scheduled event. Additional information may be attached to this application form, as needed.

Annual Christmas Parade, this year we are requesting the use of Sylvan Park to be used for a couple local vendors and music on the stage prior to the parade starting.

Select and Describe All City Provided Services That May Apply to Your Request :

- [x] Traffic (*Personnel, equipment, cones, barricades, no-parking* 145 barricades
- [x] Police (*Public Safety Personnel)* 10 CSO + 2 Motor Officers
- [x] Fire (*Paramedics, Inspectors)* 4 paramedics
- [x] Parks *(Cleanup Personnel, Ball Field Lights)* Street sweepers,
- [x] Facility Ed hales Park

Refuse/Recycling *(Event Receptacles, Roll-Off Service)* acquired by Event Organizers through Redlands Customer Service

Section 13.65 of the Redlands Municipal Code requires that events that serve more than 2,000 individuals per day will be required to submit for review and approval a Large Venue Recycling Plan. The Quality of Life Department may require smaller events to comply with City recycling practices as a condition of waiving fees.

- [x] Other Show mobile, 70 recycle boxes

Group/Organization Name: The Kiwanis Club of Redlands

Is your Group/Organization a Registered Non-Profit: [x] Yes [ ] No **Non-Profit Federal Tax ID Number:**

Does your Group/Organization Presently Have Liability Insurance? [x] Yes [ ] No

Please be advised that depending upon your request, you may be required to provide proof of insurance coverage in an amount determined by the City and naming the City as an additional insured.

Has your Group/Organization received fee waivers from the City in the past? Yes

Primary Contact Name & Title: Justin Bouzane, Chair

Mailing Address: PO BOX 1102, REDLANDS, CA 92373

Phone Number: 909-815-8148 **E-Mail Address:** kiwanisxmas@gmail.com

Updated 6/2021

As a part of our commitment to fiscal responsibility, the City of Redlands gathers data associated with the economic and social benefits associated with in-kind support. Please provide estimates, as applicable, for your event.

Positive outcomes for your organization from this

Recognition from the community for our organization hosting this annual event and will lead to new members.

Describe what economic benefit and impact this event will bring to the City:

Exposure of our great community to others, exposing schools, churches, restaurants and our community.

In April 2002, the City Council adopted Resolution No. 6038, which encourages groups or organizations requesting in-kind support from the City to use local businesses when procuring goods and services associated with the event. Receipts will need to be submitted through a follow up form. Failure to submit post event documentation (within 15 days) may affect future requests.

	Proposed Event	Previous Event Actuals	Vendors
Attendance: Redlands Residents	both = 25,000	both = 25,000	0
Attendance: Non-Residents	both = 25,000	both = 25,000	0
Food & Beverage Sales	$5,000	0	0
Merchandise Sales	0	0	0
Ticket/Entrance Fees	$35-50	$35-$50	0
Other			0
Total Revenue	$10,000 Approx	$7,500 Approx	0

I certify that all statements on this application are true and complete to the best of my knowledge.

Signature: [signature] **Title:** Chair

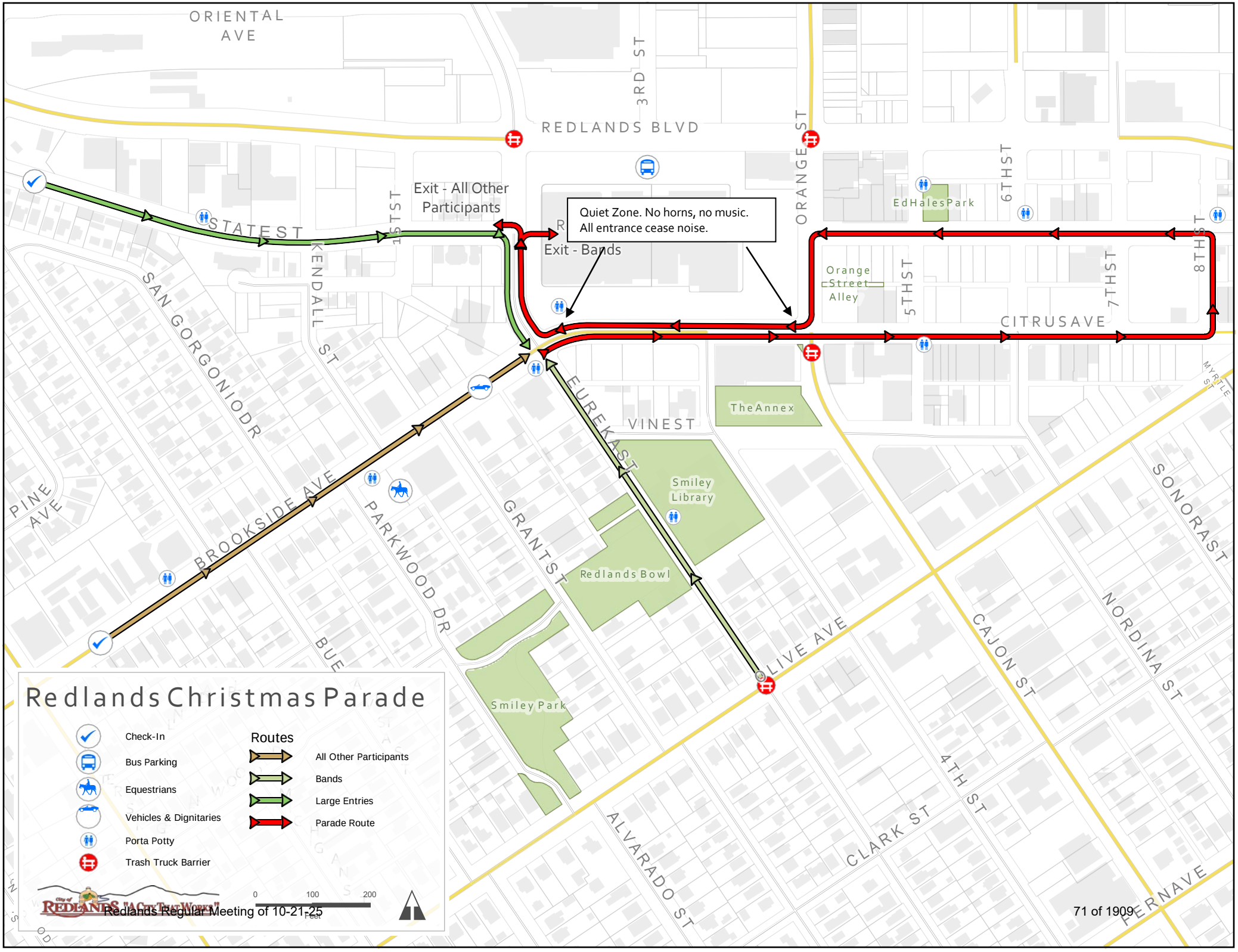
Please Print Your Name: Justin Bouzane **Date:** 6/1/2025

To Be Completed by the City of Redlands

Date Received: 06/03/2025 **Received By:** Jaclyn Ramirez

Notes:

City Manager Approval: City Council Approval:


ORIENTAL AVE
REDLANDS BLVD
3RD ST
ORANGE ST
6TH ST
EdHalesPark
Exit - All Other Participants
Quiet Zone. No horns, no music.
All entrance cease noise.
Exit - Bands
STATE ST
KENDALL ST
15TST
SAN GORGONIO DR
Orange Street Alley
5TH ST
7TH ST
8TH ST
CITRUSAVE
MYRTLE ST
TheAnnex
VINEST
EUREKA ST
Smiley Library
Redlands Bowl
Smiley Park
PINE AVE
BROOKSIDE AVE
PARKWOOD DR
GRANT ST
LIVE AVE
SONORA ST
CAJON ST
NORDINA ST
4TH ST
CLARK ST
ALVARADO ST
Redlands Christmas Parade
Check-In
Bus Parking
Equestrians
Vehicles & Dignitaries
Porta Potty
Trash Truck Barrier
Routes
All Other Participants
Bands
Large Entries
Parade Route
0
100
200
Feet

KIWANIS CLUB OF REDLANDS K00749

EIN: | United States

Other Names

KIWANIS CLUB OF REDLANDS

Copies of Returns (990, 990-EZ, 990-PF, 990-T)

Electronic copies (images) of Forms 990, 990-EZ, 990-PF or 990-T returns filed with the IRS by charities and non-profits.

- Tax Year 2022 Form 990EO
- Tax Year 2021 Form 990EO
- Tax Year 2019 Form 990EO
- Tax Year 2018 Form 990EO
- Tax Year 2017 Form 990EO
- Tax Year 2016 Form 990EO

Event: Christmas Parade Date: 12/06/25

PERMIT TO CLOSE STREET FOR SOCIAL EVENT(S)

Permission to close a street for an event is subject to the following requirements:

1.	**Street Closure Diagram MUST be attached. (Failure to submit diagram will result in non-issuance of permit).**
2.	**Event Flyer or Event Description MUST be attached. (Failure to submit flyer or event description will result in non-issuance of permit).**
3.	**Applicant MUST provide insurance coverage per City's requirements (see reverse)**
4.	Written permission from all residents of the effected portion of the street MUST be attached.
5.	No tables or other objects shall be placed on the street surface.
6.	No alcohol shall be consumed on the street or City right-of-way outside of a permitted area.
7.	Temporary No Parking Signs and barricades shall be supplied and posted by City Staff
8.	Affected street(s) shall remain accessible for emergency vehicles and local traffic at all times.
9.	This permit pertains only to the closing of the street(s). This permit does not relate to the type of activity, noise, or any other aspect of the event. All other applicable and appropriate ordinances and laws apply.

Permission is hereby granted to: Kiwanis Club of Redlands

To close (street names) Brookside & Center- Citrus & 8th, State St & 8th - State & Orange

Between (street names) Eureka & Redlands Bl - Eureka & Olive, State & Center - State & Eureka

Day & date 12/06/25 **Event times -** from (time) 6 ☐ am ☒ pm to (time) 9 ☐ am ☒ pm

- Address of Applicant: 1654 FORD ST REDLANDS CA · Phone No: 909-792-0809
- Signature of Applicant: _____ · Applicant Name (print): DAVE AHLERS

Condition(s);**set up & clean up time required**: Traffic Control provided by Redlands PD.

Event Description: _____

FOR OFFICE USE ONLY

This permit must be signed by the Chief of Police in order to be valid.

1. _____ Chief of Police — Date: 8/12/25
2. _____ Municipal Utilities & Engineering Department — Date: 9/14/25
3. _____ Facilities & Community Services Department — Date: 8/4/25
4. _____ Risk Management Division — Date: 8/14/25

Street Closure time: From 2 ☐ am ☒ pm To 10 ☐ am ☒ pm

Staff Notes:

In anticipation of the City Council's consideration of this request, staff has compiled the following table outlining costs related to fees established by Resolution of the City Council and departmental charges pertaining to personnel and equipment resources necessary for the support of the event. The departmental charges are costs outside of normal City operations that would not be incurred by the City if the special event was not taking place.

Departmental Charges (Personnel & Equipment)	**2024-2025 Amount**	**Type**	**2023-2024 Amount**
Police Personnel[1]	$42,989.00	Hard Cost	$30,083.00
Fire Personnel[1]	$2,314.71	Hard Cost	$1,836.72
Facilities & Community Services Personnel[1]	$4,725.00	Hard Cost	$3,938.00
Personnel & Equipment Subtotal	**$50,028.71**		$36,097.72
Fees Established by City Council Resolution			
Park Reservation	$94.00	Soft Cost	$94.00
FCS Equipment	$2,335.00	Soft Cost	$695.00
Fire Equipment	$683.00	Soft Cost	$400.00
Fees Subtotal	**$3,112.00**		**$1,189.00**
Total Departmental Charges and Fees	**$53,140.71**		$37,286.72
	$50,028.71 **$3,112.00** **$53,140.71**	Hard Cost Soft Cost Total	**$36,097.72** **$1,189.00** **$37,286.72**

[1]*Personnel costs are calculated conservatively assuming the highest staff cost scenario. Actual costs may vary on the day of the event based on the actual staff present. Actual costs will be confirmed following the event and will be included in a reconciliation report presented to the City Council.*

The following table summarizes the total estimated costs associated with the use of City resources and waiver of fees approved for events scheduled during Fiscal Year 2024-25 to date:

TABLE 2: FY 2024-25 Fee Waivers to date

Hard Costs	**Soft Costs**	**Deposits Refunded**	**Waiver Amount**	**Net Amount**
$100,803.12	$7,710.00	$0.00	$108,213.12	$108,213.12

City Council Meeting **H. 8.**

DATE: 10/21/2025

TO: Honorable Mayor and City Council Members

SUBJECT: Approve an Agreement with Wildlife Control Service, Inc. for Pest Abatement Services for an amount not-to-exceed $225,000.60 (Facilities and Community Services Director Crocker)

MOTION(S):

If the City Council determines that staff's recommendation is appropriate, the following motion is provided:

"I move to approve an agreement with Wildlife Control Service, Inc. to provide pest abatement services for an amount not-to-exceed $225,000.60 for a term of three years."

RECOMMENDATION:

Staff recommends City Council approve an agreement with Wildlife Control Service, Inc. to provide pest abatement services for various city facilities, medians, trails and parks for an amount not-to-exceed $225,000.60 for a term of three years.

DISCUSSION:

The Facilities and Community Services Department (FCS) is responsible for the daily maintenance of various city facilities, medians, trails and parks, involving the management of pest infestations. Due to the specific certifications and licenses required to apply pest control treatments, FCS contracts with external vendors to perform these services on a recurring maintenance schedule. Utilizing these outside services ensures consistent pest control while allowing city staff to focus on more specialized tasks.

Staff followed the City's procurement protocol by preparing a Request for Bids for pest abatement services. Nineteen vendors were solicited, and on July 2, 2025, the City Clerk's office received and opened four bids. Staff evaluated the

bids for conformance with the purchasing ordinance, verified the total price as shown in the table below, and checked references. Wildlife Control Service, Inc., met all the bidding requirements and was deemed the apparent lowest responsive and responsible bidder.

Bidder	Base Bid Amount	Alternate Bid Amount	Total Bid Amount
Wildlife Control Service, Inc, Perris, CA	$75,000.20	$0.00	$75,000.20
EagleShield Pest Control, Inc., Clovis, CA	$123,240.00	$32,640.00	$155,880.00
Dewey Pest Control, Colton, CA	$186,200.00	$0.00	$186,200.00
CDS Services, Inc dba Legion Pest, Murrieta, CA	$214,684.00	$47,304.00	$261,988.00

Staff is recommending that the City Council approve an agreement with Wildlife Control Service, Inc., in an amount not to exceed $225,000.60 for a term of three years.

ALTERNATIVES:

The Council may reject the award to Wildlife Control Services, Inc. and provide alternative direction to staff.

STRATEGIC PLAN:

Priority A - Parks, Recreation and Open Space

SUBMITTED BY:
Tabitha Crocker, Facilities and Community Services Director

RECOMMENDED BY:
Charles M. Duggan Jr., City Manager

REVIEWED BY:
Yvette M. Abich Garcia, City Attorney
Janice McConnell, Assistant City Manager
Christopher Boatman, Assistant City Manager
Danielle Garcia, Management Services/Finance Director
Dana Abramovitz-Daniel, Procurement Manager

PREPARED BY:
Jocelynn Butters, Senior Administrative Assistant

Fiscal Impact

Fiscal Year: FY 2025-26
Amount: $75,000.20
Budgeted Y/N: Yes
Account No.: 101303, 562900
Discussion:

Sufficient funding for this service is included in the Parks (101303) and Cemetery (562900) Division's budget for Fiscal Year 2025-26 as approved by City Council. Costs associated with future fiscal years will be included in subsequent budget requests prepared by the Department.

Attachments

A. Agreement with Wildlife Control Service
B. City Clerk Bid Opening

AGREEMENT TO PERFORM NON-PROFESSIONAL SERVICES FOR IMPROVEMENT TO PUBLIC BUILDINGS AND GROUNDS

This agreement for the provision of Gopher and Fire Ant Abatement and Control Services ("Agreement") is made and entered in this 21st day of October, 2025 ("Effective Date"), by and between the City of Redlands, a municipal corporation ("City") and Wildlife Control Services, Inc. a California corporation ("Contractor"). City and Contractor are sometimes individually referred to herein as a "Party" and, together, as the "Parties." In consideration of the mutual promises contained herein, City and Contractor agree as follows:

ARTICLE 1 – ENGAGEMENT OF CONTRACTOR

1.1 City hereby engages Contractor to perform gopher and fire ant abatement control services for City (the "Services"). The Services that Contractor shall perform are more particularly described in Exhibit "A," titled "Scope of Services," which is attached hereto and incorporated herein by this reference.

1.2 The Services shall be performed by Contractor in a professional manner, and Contractor represents that it has the skill and the professional expertise necessary to provide the Services to City at a level of competency presently maintained by other practicing professional Contractors in the industry providing like and similar types of Services.

ARTICLE 2 – RESPONSIBILITIES OF CONTRACTOR

2.1 Contractor shall comply with all applicable federal, state and local laws and regulations in the performance of the Services including, but not limited, to all applicable Labor Code and prevailing wage laws and non-discrimination laws, including the Americans with Disabilities Act. Pursuant to Labor Code section 1773.2, copies of the prevailing rates of per diem wages as determined by the Director of the California Department of Industrial Relations for each craft, classification or type of worker needed to undertake the Services are on file at City's Municipal Utilities and Engineering Department, located at the Civic Center, 35 Cajon Street, Suite 15A (Mailing: P.O. Box 3005), Redlands, California 92373.

2.2 Contractor acknowledges that if it violates the Labor Code provisions relating to prevailing wages that City may enforce such provisions by withholding payments to Contractor or its subcontractors pursuant to Labor Code section 1771.6.

2.3 If Contractor executes an agreement with a subcontractor to perform any portion of the Services, Contractor shall comply with Labor Code sections 1775 and 1777.7, and shall provide the subcontractor with copies of the provisions of Labor Code sections 1771, 1775, 1776, 1777.5, 1813 and 1815. Contractor acknowledges that the statutory provisions establishing penalties for failure to comply with state wage and hour laws and to pay prevailing wages may be enforced by City pursuant to Labor Code sections 1775 and 1813.

2.4 Contractor and its subcontractors shall comply with the provisions of Labor Code section 1776 regarding payroll records maintenance, certifications, retention and inspection.

2.5 Contractor acknowledges that eight (8) hours constitutes a legal day's work pursuant to Labor Code section 1810.

2.6 Contractor shall comply with the provisions of Labor Code section 1777.5 as to apprenticeships, and Labor Code sections 1771, 1775, 1776, 1777.5, 1813 and 1815.

2.7 Pursuant to Public Contract Code section 7103.5(b), Contractor offers and agrees to assign to City all rights, title and interest in and to all causes of action it may have under section 4 of the Clayton Act (15 U.S.C. section 15) or under the Cartwright Act (Chapter 2 (commencing with section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, goods or materials pursuant to this Agreement.

ARTICLE 3 – RESPONSIBILITIES OF CITY

3.1 City shall make available to Contractor information in its possession that may reasonably assist Contractor in performing the Services.

3.2 City designates Tabitha Crocker, Facilities and Community Services Director, as City's representative with respect to performance of the Services, and such person shall have the authority to transmit instructions, receive information, interpret and define City's policies and decisions with respect to performance of the Services.

ARTICLE 4 – PERFORMANCE OF SERVICES

4.1 The Services shall commence as of the Effective Date of this Agreement. Contractor shall perform and complete the Services in a prompt and diligent manner in accordance with the schedule set forth in Exhibit "A," which is attached hereto and incorporated herein by this reference.

4.2 The term of this Agreement shall be for a period of three (3) years from the Effective Date of this Agreement (the "Initial Term").

ARTICLE 5 – PAYMENTS TO CONTRACTOR

5.1 Compensation: The compensation for Contractor's performance of the Services shall not exceed the amount of Two-Hundred Twenty Five Thousand Dollars and Sixty Cents ($225,000.60). City shall pay Contractor on a time and materials basis up to the not to not-to-exceed amount in accordance with the rates specified in Exhibit "B," titled "Fee Schedule," which is attached hereto and incorporated herein by reference.

5.2 Contractor shall submit monthly invoices to City describing the Services performed during the preceding month. Contractor's invoices shall include a brief description of the Services performed, the dates the Services were performed, the number of hours spent and by whom. City shall pay Contractor no later than thirty (30) days after receipt and approval by City of Contractor's invoice.

5.3 Any notice or other communication required, or which may be given, pursuant to this Agreement, shall be in writing. Any such notice shall be deemed delivered (i) on the date of delivery in person; (ii) five (5) days after deposit in first class registered mail, with return receipt requested; (iii) on the actual delivery date if deposited with an overnight courier; or (iv) on the date sent by facsimile or electronic mail transmission (including PDF), if confirmed with a copy sent contemporaneously by first class, certified, registered or express mail; in each case properly posted and fully prepaid to the appropriate address set forth below, or such other address as a Party may provide notice in accordance with this section:

CITY	CONTRACTOR
City Clerk City of Redlands 35 Cajon Street P.O. Box 3005 (mailing) Redlands, CA 92373 jdonaldson@cityofredlands.org (909) 798-7531	Jon Lorenz, President Wildlife Control Service, Inc 21200 Ridgedale Dr. Perris, CA 92570 jon@gotgophers.net (951) 780-2373

ARTICLE 6 – INSURANCE AND INDEMNIFICATION

6.1 The following insurance coverage required by this Agreement shall be maintained by Contractor for the duration of its performance of the Services. Contractor shall not perform any Services unless and until the required insurance listed below is obtained by Contractor. Contractor shall provide City with certificates of insurance and endorsements evidencing such insurance prior to commencement of the Services. Insurance policies shall include a provision prohibiting cancellation or modification of the policy except upon thirty (30) days prior written notice to City.

A. Workers' Compensation and Employer's Liability insurance in the amount that meets statutory requirements with an insurance carrier acceptable to City, or certification to City that Contractor is self-insured or exempt from the workers' compensation laws of the State of California. Contractor shall execute and provide City with Exhibit "C," titled "Workers' Compensation Insurance Certification," which is attached hereto and incorporated herein by this reference, prior to performance of the Services.

B. Comprehensive General Liability insurance with carriers acceptable to City in the minimum amount of One Million Dollars ($1,000,000) per occurrence and Two Million Dollars ($2,000,000) aggregate, for public liability, property damage and personal injury is required. City shall be named as an additional insured and such insurance shall be primary and non-contributing to any insurance or self-insurance maintained by City.

C. Business Auto Liability coverage, with minimum limits of One Million Dollars ($1,000,000) per occurrence, combined single limit bodily injury liability and property damage liability. This coverage shall include all Contractor owned vehicles

used in connection with Contractor's provision of the Services, hired and non-owned vehicles, and employee non-ownership vehicles. City shall be named as an additional insured and such insurance shall be primary and non-contributing to any insurance or self-insurance maintained by City.

6.2 Contractor shall defend, indemnify, and hold harmless City and its elected and appointed officials, employees and agents from and against any and all claims, losses and liability, including attorneys' fees, arising from injury or death to persons or damage to property occasioned by any negligent act or omission by, or the willful misconduct of, Contractor, or its officers, employees and agents in performing the Services.

ARTICLE 7 – CONFLICTS OF INTEREST

7.1 Contractor covenants and represents that it does not have any investment or interest in any real property that may be the subject of this Agreement or any other source of income, interest in real property or investment that would be affected in any manner or degree by the performance of Contractor's Services. Contractor further covenants and represents that in the performance of its duties hereunder, no person having any such interest shall perform any Services under this Agreement.

7.2 Contractor agrees it is not a designated employee within the meaning of the Political Reform Act because Contractor:

A. Does not make a governmental decision whether to:

(i) approve a rate, rule or regulation, or adopt or enforce a City law;
(ii) issue, deny, suspend or revoke any City permit, license, application, certification, approval, order or similar authorization or entitlement;
(iii) authorize City to enter into, modify or renew a contract;
(iv) grant City approval to a contract that requires City approval and to which City is a party, or to the specifications for such a contract;
(v) grant City approval to a plan, design, report, study or similar item;
(vi) adopt, or grant City approval of, policies, standards or guidelines for City or for any subdivision thereof.

B. Does not serve in a staff capacity with City and in that capacity, participate in making a governmental decision or otherwise perform the same or substantially the same duties for City that would otherwise be performed by an individual holding a position specified in City's Conflict of Interest Code under Government Code section 87302.

7.3 In the event City determines that Contractor must disclose its financial interests, Contractor shall complete and file a Fair Political Practices Commission Form 700, Statement of Economic Interests, with the City Clerk's office pursuant to the written instructions provided by the City Clerk.

ARTICLE 8 – GENERAL CONSIDERATIONS

8.1 In the event any action is commenced to enforce or interpret any of the terms or conditions of this Agreement the prevailing Party shall, in addition to any costs and other relief, be entitled to the recovery of its reasonable attorneys' fees, including fees for the use of in-house counsel by a Party.

8.2 Contractor shall not assign any of the Services, except with the prior written approval of City and in strict compliance with the terms and conditions of this Agreement. Any assignment or attempted assignment without such prior written consent may, in the sole discretion of City, results in City's immediate termination of this Agreement.

8.3 Contractor is for all purposes under this Agreement an independent contractor and shall perform the Services as an independent contractor. Neither City nor any of its agents shall have control over the conduct of Contractor or Contractor's employees, except as herein set forth. Contractor shall supply all necessary tools and instrumentalities required to perform the Services. Assigned personnel employed by Contractor are for its account only, and in no event shall Contractor or personnel retained by it be deemed to have been employed by City or engaged by City for the account of, or on behalf of City. Contractor shall have no authority, express or implied, to act on behalf of City in any capacity whatsoever as an agent, nor shall Contractor have any authority, express or implied, to bind City to any obligation.

8.4 This Agreement may be terminated by City, in its sole discretion, by providing not less than five (5) days prior written notice to Contractor of City's intent to terminate. If this Agreement is terminated by City, an adjustment to Contractor's compensation shall be made, but (i) no amount shall be allowed for anticipated profit or unperformed Services, and (ii) any payment due Contractor at the time of termination may be adjusted to the extent of any additional costs to City occasioned by any default by Contractor. Upon receipt of a termination notice, Contractor shall immediately discontinue its provision of the Services and, within five (5) days of the date of the termination notice, deliver or otherwise make available to City, copies (in both hard copy and electronic form, where applicable) of project related data, design calculations, drawings, specifications, reports, estimates, summaries and such other information and materials as may have been accumulated by Contractor in performing the Services. Contractor shall be compensated on a pro-rata basis for Services completed up to the date of termination.

8.5 Contractor shall maintain books, ledgers, invoices, accounts and other records and documents evidencing costs and expenses related to the Services for a period of three (3) years, or for any longer period required by law, from the date of final payment to Contractor pursuant to this Agreement. Such books shall be available at reasonable times for examination by City at the office of Contractor.

8.6 This Agreement, including the Exhibits incorporated herein by reference, represents the entire agreement and understanding between the Parties as to the matters contained herein, and any prior negotiations, written proposals or verbal agreements relating to such matters are superseded by this Agreement. Except as otherwise provided for herein, any amendment to this Agreement shall be in writing, approved by City and signed by City and Contractor.

8.7 This Agreement shall be governed by and construed in accordance with the laws of the State of California, without regard to its conflicts of laws provisions. The Parties agree that all actions or proceedings arising in connection with this Agreement shall be tried and litigated only in the state courts located in San Bernardino County, California, and the federal courts located in Riverside County, California.

8.8 If one or more of the sentences, clauses, paragraphs or sections contained in this Agreement is declared invalid, void or unenforceable by a court of competent jurisdiction, the same shall be deemed severable from the remainder of this Agreement and shall not affect, impair or invalidate the remaining sentences, clauses, paragraphs or sections contained herein, unless to do so would deprive a Party of a material benefit of its bargain under this Agreement.

IN WITNESS WHEREOF, duly authorized representatives of City and Contractor have signed in confirmation of this Agreement.

CITY OF REDLANDS

By: _____
Mario Saucedo, Mayor

WILDLIFE CONTROL SERVICE, INC

By: _____
Jon Lorenz, President

ATTEST:

_____
Jeanne Donaldson, City Clerk

EXHIBIT "A"

SCOPE OF SERVICES

1. Program Objectives

- Maintain 90% gopher control across designated City parks, medians, trails, facilities, and cemetery grounds.
- Provide integrated pest management (IPM) services for ground squirrels, moles, voles, and imported fire ants.
- Ensure compliance with San Bernardino County Agriculture permits and California Department of Pesticide Regulations.
- Provide courteous, safe, and professional service with full coordination with City staff.

2. General Requirements

- Contractor shall furnish all permits, labor, supervision, materials, and equipment.
- Carbon monoxide delivery devices may only be used with written authorization by the Parks Supervisor.
- Approved methods include: burrow fumigation with aluminum phosphide; rodenticide baiting (strychnine bait, anticoagulants).
- After each application, Contractor shall inspect sites and remove any exposed carcasses.
- Monthly reports documenting treatments, methods, and observations are required.
- Contractor shall attend quarterly review meetings with City staff.

3. Scope of Services by Location

Weekly Park Gopher Abatement (52 services per year)

- Community Park & Baseball Fields – 1535 N. Church St. (9.1 acres)
- Crafton Park – 601 N. Wabash Ave. (6.8 acres)
- Israel Beal Park – 255 Riverview Dr. (7.8 acres)
- Oakmont Park – 31212 Sutherland Dr. (15 acres)
- Prospect Park – 1352 Prospect Dr. (35 acres)
- Redlands Sports Park – 1790 N. Dearborn St. (48 acres)
- Texonia Park – 1321 Texas St. (11 acres)
- The Terrace – 106 & 500 E. Colton Ave. (2.5 acres)
- Brookside Park – 1630 Brookside Ave. (9.3 acres)
- Ford Park – 955 Parkford Dr. (20 acres)
- Heritage Park – 11126 Iowa St. (18 acres)
- Jennie Davis Park – 923 W. Redlands Blvd. (4 acres)
- Smiley Park (incl. Redlands Bowl, PD Annex, Smiley Library) – 168 S. Eureka St. (9.2 acres)
- Sylvan Park – Chapel St. (23 acres)
- Redlands Blvd. Median (Fern St. to Ford St.) – 3.23 acres
- Laramie Park – Lincoln & Laramie St. (0.5 acres)

- Caroline Park – 320 W. Sunset Dr. (17 acres)
- Barton/Brookside Median (Center St. to Cajon St.) – 0.50 acres
- Barton/Brookside Median (Price St. to Center St.) – 0.82 acres
- Barton/Brookside Median (Terracina Blvd. to Kansas St.) – 0.47 acres
- California St. Median (north of Orange Tree Ln.) – 0.17 acres
- Eureka St. Medians (Pearl St. to Redlands Blvd.) – 0.06 acres
- West State St. Medians (Tennessee St. to New York St.) – 0.16 acres
- Corporate Yard – 1270 W. Park Ave. (1.07 acres)
- Ed Hales Park – 101 E. State St. (0.79 acres)
- Orange Blossom Trail East – Grove St. to Wabash Ave. (8.47 acres)
- Simonds Parkway – 0.68 acres
- Redlands Blvd. Median (Alabama St. at Redlands Blvd.) – 0.49 acres
- Downtown Rail Station – Al Harris Ln. & Orange St. (0.03 acres)
- Gateway Freeway On/Off Ramps – Eureka/Orange to 6th St. (8.01 acres)
- Lincoln Park – Sylvan Blvd. & Lincoln St. (3.74 acres)
- Riverview Park/Bluff Trail – Cave St. to Riverbend Dr. (6.40 acres)
- University Rail Station – University St. to Cook St. (0.66 acres)
- West State St. Medians (New York St. to Tennessee St.) – 0.16 acres
- Zanja Trail – Lincoln St. to Wabash Ave. (4.27 acres)
- Zanja Trail – 9th St. to Church St. (1.12 acres)

Hillside Memorial Park (Weekly)

- Cemetery Grounds – 1540 Alessandro Rd.

As Needed (Monthly)

- Civic Center – 35 Cajon St.
- Orange Blossom Trail West – Alabama St. to California St./Redlands Blvd.
- YMCA Parking Lot – 500 E. Citrus Ave.

Fire Ant Abatement (Twice per month, 24 services per year)

- Brookside Park – 1630 Brookside Ave. (9.3 acres)
- Community Park & Baseball Fields – 1535 N. Church St. (9.1 acres)
- Crafton Park – 601 N. Wabash Ave. (6.8 acres)
- Ed Hales Park – 101 E. State St. (0.6 acres)
- Ford Park – 955 Parkford Dr. (20 acres)
- Israel Beal Park – 255 Riverview Dr. (7.8 acres)
- Jennie Davis Park – 923 W. Redlands Blvd. (4 acres)
- Lincoln Shrine – 125 W. Vine St.
- Police Annex – 30 Cajon St.
- Prospect Park – 1352 Prospect Dr. (35 acres)
- Redlands Bowl – 25 Grant St.
- Redlands Sports Park – 1790 N. Dearborn St. (48 acres)
- Smiley Library – 125 W. Vine St. (9.2 acres)

- Smiley Park – 168 S. Eureka St. (9.2 acres)
- Sylvan Park – 730 Chapel St. (23 acres)
- Texonia Park – 1321 Texas St. (11 acres)

4. Fire Ant Control Specifications

- Bi-Annual Treatments: Late spring/early summer and late summer/early fall.
- Monthly Inspections: All sites checked monthly; colonies treated as needed.
- Treatment Method: Bait-type insecticides to sterilize queens; contact insecticides for active colonies.

5. Deliverables

- Proof of permits and applicator certifications.
- Monthly service reports (treatments, products, locations, carcass removal).
- Annual summary of program effectiveness and recommendations.

EXHIBIT "B"

"Fee Schedule"

WEEKLY SERVICE		
Community Park & Baseball Fields	1535 N. Church St.	$1,976.00
Crafton Park	601 N. Wabash Ave.	$1,976.00
Israel Beal Park	255 Riverview Dr.	$1,976.00
Oakmont Park	31212 Sutherland Dr.	$1,976.00
Prospect Park	352 Prospect Dr.	$1,976.00
Redlands Sports Park (field & perimeter)	1790 N. Dearborn St.	$1,976.00
Texonia Park	1321 Texas St.	$1,976.00
The Terrace	106 E. Colton Ave. & 500 E. Colton Ave.	$1,976.00
Brookside Park	1630 Brookside Avenue	$1,976.00
Ford Park	955 Parkford Drive	$1,976.00
Heritage Park	11126 Iowa Street	$1,976.00
Jennie Davis Park	923 W. Redlands Blvd	$1,976.00
Smiley Park 168 S. Eureka St.	(Includes Redlands Bowl, PD Annex & Smiley Library)	$1,976.00
Sylvan Park	Chapel Street	$1,976.00
Redlands Blvd. Median	(Fern Street to Ford Street)	$1,976.00
Laramie Park (Grass/Play Area Only)	Lincoln and Laramie Street	$1,976.00
Caroline Park	320 W. Sunset Dr.	$1,976.00
Barton/Brookside Median	Center Street to Cajon St	$1,976.00
Barton/Brookside Median	Price Street to Center Street	$1,976.00
Barton/Brookside Median	Terracina Blvd to Kansas St	$1,976.00
California Street Medians	(First median north of Orange Tree Lane)	$1,976.00
Eureka Street Medians	(Pearl Street to Redlands Blvd)	$1,976.00

WEEKLY SERVICE		
West State Street Medians	(Tennessee St to New York St)	$1,976.00
Corporate Yard	1270 W Park Ave	$1,976.00
Ed Hales Park	101 E State St	$1,976.00
Orange Blossom Trail East	(Grove St to Wabash Ave)	$1,976.00
Simonds Parkway	Garden St at Rossmont Dr	$1,976.00
Redlands Blvd. Median	(Alabama at Redlands Blvd)	$1,976.00
Downtown Rail Station	(Al Harris Ln and Orange St)	$1,976.00
Gateway Freeway On & Off ramps	(Eureka St/Orange St to 6th St	$1,976.00
Lincoln Park	(Sylvan Blvd & Lincoln St)	$1,976.00
Riverview Park/Bluff Trail	(Cave St to Riverbend Dr on Riverview Dr)	$1,976.00
University Rail Station	(University St to Cook St on Park Ave)	$1,976.00
West State Street medians	(New York St to Tennessee St)	$1,976.00
Zanja Trail	(Lincoln St to Wabash Ave)	$1,976.00
Zanja Trail	(9th St to Church St)	$1,976.00

Civic Center	35 Cajon St	$629.40
Orange Blossom Trail West	(Alabama St. to California St/Redlands Blvd.)	$629.40
YMCA Parking Lot	500 E. Citrus Ave	$629.40

Hillside Memorial Park	1540 Alessandro Rd	$1,976.00

ANT ABATEMENT INCLUDED IN GOPHER ABATEMENT PRICE	
Brookside Park	1630 Brookside Ave
Community Park & baseball fields	1535 N. Church St.
Crafton Park	601 N. Wabash Ave.
Ed Hales Park	101 E. State St.
Ford Park	955 Parkford Dr.
Isreal Beal Park	255 Riverview Dr.
Jeannie Davis Park	923 W. Redlands Blvd.
Lincoln Shrine	125 W. Vine St.
Police Annex	30 Cajon St.
Prospect Park	352 Prospect Dr.
Redlands Bowl	25 Grant St.
Redlands Sports Park	1790 N. Dearborn St.
Smiley Library	125 W. Vine St.
Smiley Park	168 S. Eureka St.
Sylvan Park	730 Chapel St.
Texonia Park	1321 Texas St.

EXHIBIT "C"

WORKERS' COMPENSATION INSURANCE CERTIFICATION

Every employer, except the State, shall secure the payment of compensation in one or more of the following ways:

(a) By being insured against liability to pay compensation by one or more insurers duly authorized to write compensation insurance in this State.

(b) By securing from the Director of Industrial Relations, a certificate of consent to self-insure, either as an individual employer, or as one employer in a group of employers, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his or her employees.

CHECK ONE

_____I am aware of the provisions of Section 3700 of the Labor Code which requires every employer to be insured against liability for Workers' Compensation or to undertake self-insurance in accordance with the provisions of that Code, and I will comply with such provisions before commencing the performance of the work and activities required or permitted under this Agreement. (Labor Code §1861).

_____I affirm that at all times, in performing the work and activities required or permitted under this Agreement, I shall not employ any person in any manner such that I become subject to the workers' compensation laws of California. However, at any time, if I employ any person such that I become subject to the workers' compensation laws of California, immediately I shall provide the City with a certificate of consent to self-insure, or a certification of workers' compensation insurance.

I certify under penalty of perjury under the laws of the State of California that the information and representations made in this certificate are true and correct.

WILDLIFE CONTROL SERVICE, INC

By:_____ Date: _____

Jon Lorenz, President

CITY OF REDLANDS
OFFICE OF THE CITY CLERK
REVISED BID OPENING REPORT

The following bid was opened on the **2nd day of July 2025 at 11:30 a.m.** on behalf of the Facilities and Community Services Department for **Gopher and Squirrel Abatement & Control No. FCS05202025JBII.** The bid amounts have not been checked and are subject to correction after the bids have been completely reviewed.

No.	Plan Holder's Name	Cover page Signed	Acknowledged Addenda (1)	Bid Amount
1	Wildlife Control Services, Inc., Perris, CA	Yes	Yes	$75,000.20
2	Eagle Shield Pest Control, Clovis, CA	Yes	Yes	$123,240.00
3	Dewey Pest Control, Colton, CA	Yes	No	$186,200.00
4	CDS Services, Inc., Murrieta, CA	Yes	No	$214,684.00

Jeanne Donaldson, City Clerk
City of Redlands, California

Emailed: Councilmembers,
City Manager, PIO, Press
Department Head: Tabitha Crocker
Staff: Jocelynn Butters

City Council Meeting **I. 1.**

DATE: 10/21/2025

TO: Honorable Mayor and City Council Members

SUBJECT: Conference Report- 2025 League of California Cities Annual Conference and Expo (Mayor Pro Tem Shaw and Council Member Davis)

DISCUSSION:

Mayor Pro Tem Shaw and Council Member Davis will provide reports relating to their attendance at the 2025 League of California Cities Annual Conference and Expo held October 8-10, 2025 in Long Beach, California.

City Council Meeting **J. 1.**

DATE: 10/21/2025

TO: Honorable Mayor and City Council Members

SUBJECT: Consideration of the following ordinances proposing to amend Title 15, Chapter 15.32 (Flood Damage Prevention) of the Redlands Municipal Code pertaining to floodplain management and flood damage prevention, and consideration of a determination of exemption from environmental review pursuant to Sections 15061(b)(3) and 15378(b)(5) of the California Environmental Quality Act Guidelines.

1. Adoption of Urgency Ordinance No. 2991,entitled, "An Urgency Ordinance of the City of Redlands Adopting Immediate Code Text Amendments to Title 15, Chapter 15.32 of the Redlands Municipal Code Relating to Flood Damage Prevention and Floodplain Management; and Declaring an Urgency for the Purpose of Protecting the Public Health, Safety, and General Welfare for Persons and Properties Within the City of Redlands;" and,

2. Introduce Ordinance No. 2992, entitled, "An Ordinance of the City of Redlands Amending Title 15, Chapter 15.32 of the Redlands Municipal Code Relating to Flood Damage Prevention and Floodplain Management." (Development Services Director Desatnik)

MOTION(S):

If the City Council determines that staff's recommendation is appropriate, the following motions are provided:

1. "I move to adopt Urgency Ordinance No. 2991, and further find that the Urgency Ordinance is exempt pursuant to Sections 15061(b)(3) and 15378(b)(5) of the California Environmental Quality Act Guidelines."

2. "I move to introduce Ordinance No. 2992, and further find that adoption of the ordinance is exempt pursuant to Sections 15061(b)(3) and 15378(b)(5) of the California Environmental Quality Act Guidelines."

RECOMMENDATION:

Staff recommends that the City Council adopt Urgency Ordinance No. 2991 (Attachment A), which requires a 4/5 vote of the Council for approval (Calif. Gov. Code § 36937), for the immediate preservation of the public health, safety, and general welfare. Staff further recommends that the City Council introduce Ordinance No. 2992 (Attachment B) to amend Redlands Municipal Code Chapter 15.32 pertaining to flood damage prevention.

DISCUSSION:

The provisions of Redlands Municipal Code Chapter 15.32 (Flood Damage Prevention) provides development standards and processing requirements regarding building permits for structures located within areas of special flood hazard as identified by the Federal Emergency Management Agency (FEMA) in the applicable flood insurance studies, Flood Insurance Rate Maps (FIRMs), and flood boundary and floodway maps.

On May 8, 2025, staff from the California Department of Water Resources provided a review checklist identifying areas in the Redlands Municipal Code not in compliance with the current California Model Floodplain Management Ordinance for Non-Coastal Communities. The proposed amendment will bring Redlands Municipal Code Chapter 15.32 into compliance with the minimum National Floodplain Program requirements. Due to the immediate need to amend Redlands Municipal Code Chapter (thereby preserving the City's present ability to continue participating in the National Flood Insurance Program), an Urgency Ordinance is necessary in conjunction with the normal code amendment process.

The proposed text amendments are identified in Attachments A and B (underlined font indicates new text, and strikethrough font indicates deleted text).

The specific facts and findings are further explained in the ordinance recitals as follows:

A. The National Flood Insurance Act of 1968 was enacted by title XIII of the Housing & Urban Development Act of 1968 (“Act”) to provide previously unavailable flood insurance protection to property owners in flood-prone areas. Under the Act and the regulations promulgated, specifically 44 CFR § 59.2, in order to qualify for the sale of federally-subsidized flood insurance, the City must adopt and submit to the Federal

Insurance Administrator an ordinance adopting flood plain management regulations that satisfy the requirements of 44 CFR Part 60 and that are designed to reduce or avoid future flood, mudslide or flood-related erosion damages and include enforcement provisions.

B. While the City of Redlands has adopted the most recent version of the California Building Code and has an ordinance for flood plain management regulations that previously satisfied the prerequisites for the National Flood Insurance Program or the regulations set forth at 44 CFR Part 60, amendments to the City's ordinance are required to continue to satisfy the National Flood Insurance Program or the regulations set forth at 44 CFR Part 60.

C. Pursuant to 44 CFR § 59.24, a government entity that is otherwise eligible for the sale of federal flood insurance shall be subject to suspension from the National Flood Insurance Program for failing to submit copies of adequate flood plain management regulations meeting the minimum requirements of 4 CFR Part 60. The Federal Insurance Administrator has provided a deadline of October 30, 2025, for the City of Redlands to adopt the required municipal code text amendment(s) to update the applicable flood plain management regulations contained in the Redlands Municipal Code.

D. The City Council finds that the impending loss of community eligibility for discounted flood insurance under the National Flood Insurance Program poses a current and immediate threat to the public health, safety, and welfare presented by floods and related conditions during the upcoming rainy season(s). In the absence of this Urgency Ordinance's immediate effectiveness, the City would be unable to secure eligibility to purchase discounted federal flood insurance for affected community members, as well as to protect the public health, safety, and welfare from the potential adverse effects of lack of insurance coverage to recover from a flood or flood-related disaster.

ALTERNATIVES:

If the City Council declines to adopt the Urgency Ordinance, then the municipal code will no longer be in compliance with applicable floodplain management regulations, and the City would be subject to suspension from the National Flood Insurance Program. In the absence of this Urgency Ordinance's immediate effectiveness, the City would be unable to secure eligibility to purchase discounted federal flood insurance for affected community members, as well as to protect the public health, safety, and welfare from the potential adverse effects of the lack of insurance coverage to recover from a flood or flood-related disaster.

STRATEGIC PLAN:

Not applicable.

SUBMITTED BY:
Brian Desatnik, Development Services Director

RECOMMENDED BY:
Charles M. Duggan Jr., City Manager

REVIEWED BY:
Yvette M. Abich Garcia, City Attorney
Janice McConnell, Assistant City Manager
Christopher Boatman, Assistant City Manager
Danielle Garcia, Management Services/Finance Director

PREPARED BY:
John Thompson, Chief Building Official

Fiscal Impact

Fiscal Year: 2025-26

Discussion:

There is no fiscal impact associated with this request.

Attachments

Attachment A-1: Urgency Ordinance No. 2991 (Legislative)
Attachment A-2: Urgency Ordinance No. 2991 (Clean)
Attachment B-1: Ordinance No. 2992 (Legislative)
Attachment B-2: Ordinance No. 2992 (Clean)

ORDINANCE NO. 2991

AN URGENCY ORDINANCE OF THE CITY OF REDLANDS ADOPTING IMMEDIATE CODE TEXT AMENDMENTS TO TITLE 15, CHAPTER 15.32, OF THE REDLANDS MUNICIPAL CODE RELATING TO FLOOD DAMAGE PREVENTION AND FLOODPLAIN MANAGEMENT; AND DECLARING AN URGENCY FOR THE PURPOSE OF PROTECTING THE PUBLIC HEALTH, SAFETY, AND GENERAL WELFARE FOR PERSONS AND PROPERTIES WITHIN THE CITY OF REDLANDS.

WHEREAS, on September 20, 2016, the City Council of the City of Redlands adopted Ordinance No. 2837 updating Title 15, Chapter 15.32 (Flood Damage Prevention), of the Redlands Municipal Code; and

WHEREAS, the City of Redlands desires to update Title 15, Chapter 15.32 (Flood Damage Prevention), of the Redlands Municipal Code to align with current applicable State and/or Federal guidance and regulations; and

WHEREAS, the City of Redlands maintains current eligibility and participation in the National Flood Insurance Program; and

WHEREAS, immediate adoption of certain necessary updates to Redlands Municipal Code Title 15, Chapter 15.32 (Flood Damage Prevention) by October 30, 2025, is necessary to maintain current eligibility for the National Flood Insurance Program; and

WHEREAS, should the City of Redlands lose its participation in the National Flood Insurance Program, such loss of insurance will result in loss of community eligibility for discounted flood insurance under the National Flood Insurance Program, and therefore, present an immediate threat to the public health, safety, and welfare of persons and properties within the City; and

WHEREAS, California Government Code section 36937 authorizes the City Council to introduce and adopt an ordinance it declares to be necessary as an urgency measure to preserve the public peace, health, and safety at one and the same meeting if passed by at least four-fifths (4/5) vote of the City Council; and

WHEREAS, the City of Redlands is in compliance with the procedural requirements of California Government Code section 36937 pertaining to the adoption of this Urgency Ordinance; and

WHEREAS, the California Environmental Quality Act (CEQA), Sections 15061(b)(3) and 15378(b)(5) of the State CEQA Guidelines, provide for appropriate exemptions from further environmental review regarding the adoption of this ordinance; and

WHEREAS, the City Council of the City of Redlands makes the following findings regarding the purpose and intent of this Urgency Ordinance:

A. The National Flood Insurance Act of 1968 was enacted by title XIII of the Housing & Urban Development Act of 1968 ("Act") to provide previously unavailable flood insurance protection to property owners in flood-prone areas. Under the Act and the regulations promulgated under the Act, specifically 44 CFR § 59.2, in order to qualify for the sale of federally-subsidized flood insurance, the City must adopt and submit to the Federal Insurance Administrator an ordinance adopting flood plain management regulations that satisfy the requirements of 44 CFR Part 60 and that are designed to reduce or avoid future flood, mudslide or flood-related erosion damages and include enforcement provisions.

B. While the City of Redlands has adopted the most recent version of the California Building Code and has an ordinance for flood plain management regulations that previously satisfied the prerequisites for the National Flood Insurance Program or the regulations set forth at 44 CFR Part 60, amendments to the City's ordinance are required by October 30, 2025, to continue to satisfy the National Flood Insurance Program or the regulations set forth at 44 CFR Part 60.

C. Pursuant to 44 CFR § 59.24, a government entity that is otherwise eligible for the sale of federal flood insurance shall be subject to suspension from the National Flood Insurance Program for failing to submit copies of adequate flood plain management regulations meeting the minimum requirements of 4 CFR Part 60. The Federal Insurance Administrator has provided a deadline of October 30, 2025, for the City of Redlands to adopt the required municipal code text amendment(s) to update the applicable flood plain management regulations contained in the Redlands Municipal Code.

D. The City Council finds that the impending loss of community eligibility for discounted flood insurance under the National Flood Insurance Program poses a current and immediate threat to the public health, safety, and welfare presented by floods and related conditions during the upcoming rainy season(s). In the absence of this Urgency Ordinance's immediate effectiveness, the City would be unable to secure eligibility to purchase discounted federal flood insurance for affected community members, as well as to protect the public health, safety, and welfare from the potential adverse effects of lack of insurance coverage to recover from a flood or flood-related disaster.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF REDLANDS DOES ORDAIN AS FOLLOWS:

SECTION 1. Section 15.32.020 of Chapter 15.32 of the Redlands Municipal Code, entitled "Definitions," is hereby amended to read as follows:

"15.32.020: DEFINITIONS:

The following words shall have the meanings ascribed to them:

ACCESSORY STRUCTURE: A structure that is accessory to and incidental to that of the dwelling(s) and that is located on the same structure.

ACCESSORY USE: A use which is incidental and subordinate to the principal use of the parcel of land on which it is located.

ALLUVIAL FAN: A geomorphologic feature characterized by a cone or fan shaped deposit of boulders, gravel, and fine sediments that have been eroded from mountain slopes, transported by flood flows, and then deposited on the valley floors, and which is subject to flash flooding, high velocity flows, debris flows, erosion, sediment movement and deposition, and channel migration.

APEX: The point of highest elevation on an alluvial fan, which on undisturbed fans is generally the point where the major stream that formed the fan emerges from the mountain front.

APPEAL: A request for a review of the chief building official's interpretation of any provision of this chapter.

AREA OF SHALLOW FLOODING: A designated AO or AH zone on the flood insurance rate map (FIRM) where the base flood depths range from one to three feet (3'), a clearly defined channel does not exist, the path of flooding is unpredictable and indeterminate, and velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

ATTENDANT UTILITIES AND EQUIPMENT: Utilities, mechanical. Electrical, fuel gas, plumbing, HVAC, and related equipment, as well as services associated with new construction and substantial improvements.

BASE FLOOD: A flood which has a one percent (1%) chance of being equaled or exceeded in any given year (also called the "100-year flood"). Base flood is the term used throughout this chapter.

BASE FLOOD ELEVATION (BFE): Elevation of flooding, including wave height, have a one percent (1%) chance of being equaled or exceeded in any given year.

BASEMENT: Any area of the building having its floor subgrade (below ground level) on all sides.

DEVELOPMENT: Any manmade change to improved or unimproved real estate, including, but not limited to, buildings, structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.

DRY FLOODPROOFING: A combination of measures that results in a structure, including the attendant utilities and equipment, being watertight with all elements substantially impermeable and with structural components having the capacity to resist flood loads.

ENCROACHMENT: The advance or infringement of uses, plant growth, fill, excavation, buildings, permanent structures or development into a floodplain which may impede or alter the flow capacity of a floodplain.

EXISTING MANUFACTURED HOME PARK OR SUBDIVISION: A manufactured home

park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the floodplain management regulations adopted by a community.

EXPANSION TO AN EXISTING MANUFACTURED HOME PARK OR SUBDIVISION: The preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads).

FLOOD BOUNDARY AND FLOODWAY MAP (FBFM): The official map on which the federal emergency management agency or federal insurance administration has delineated both the areas of special flood hazard and the floodway.

FLOOD, FLOODING, OR FLOODWATER:

A. A general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland or tidal waters, the unusual and rapid accumulation or runoff of surface waters from any source, and/or mudslides (i.e., mudflows); and

B. The condition resulting from flood related erosion.

FLOOD HAZARD BOUNDARY MAP: The official map on which the federal emergency management agency or federal insurance administration has delineated the areas of flood hazards.

FLOOD INSURANCE RATE MAP (FIRM): The official map on which the federal emergency management agency or federal insurance administration has delineated both the areas of special flood hazards and the risk of premium zones applicable to the community.

FLOOD INSURANCE STUDY: The official report provided by the federal insurance administration that includes flood profiles, the flood insurance rate map, the flood boundary and floodway map and the water surface elevation of the base flood.

FLOODPLAIN ADMINISTRATOR: The city's chief building official.

FLOODPLAIN MANAGEMENT: The operation of an overall program of corrective and preventive measures for reducing flood damage and preserving and enhancing, where possible, natural resources in the floodplain, including, but not limited to, emergency preparedness plans, flood control works, floodplain management regulations and open space plans.

FLOODPLAIN MANAGEMENT REGULATIONS: This chapter, subdivision regulations, building codes, health regulations, ordinances (such as grading and erosion control) and other applications of police power regulations which control development in flood prone areas. This term describes federal, state or local regulations, in any combination thereof, which provide standards for preventing and reducing flood loss and damage.

FLOODPLAIN OR FLOOD PRONE AREA: Any land area susceptible to being inundated by water from any source (see definition of Flood, Flooding, Or Floodwater).

FLOODPROOFING: Any combination of structural and nonstructural additions, changes or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

FLOODWAY: The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot (1') ~~(referred to as "regulatory floodway")~~.

FLOODWAY FRINGE: That area of the floodplain on either side of the "regulatory floodway" where encroachment may be permitted.

FRAUD AND VICTIMIZATION: As related to sections 15.32.180 and 15.32.190 of this chapter, means that the variance granted must not cause fraud on or victimization of the public. In examining this requirement, the city will consider the fact that every newly constructed building adds to government responsibilities and remains a part of the city for fifty (50) to one hundred (100) years. Buildings that are permitted to be constructed below the base flood elevation are subject during all those years to increased risk of damage from floods, while future owners of the property and the city as a whole are subject to all the costs, inconvenience, danger, and suffering that those increased flood damages bring. In addition, future owners may purchase the property, unaware that it is subject to potential flood damage, and can be insured only at very high flood insurance rates.

FUNCTIONALLY DEPENDENT USE: A use which cannot perform its intended purpose unless it is located or carried out in close proximity to water.

GOVERNING BODY: The city council of the city of Redlands that is empowered to adopt and implement regulations to provide for the public health, safety and general welfare of its citizenry.

HARDSHIP: As related to section 15.32.190 of this chapter, means the exceptional hardship that would result from a failure to grant a requested variance. The city council requires that the variance be exceptional, unusual, and peculiar to the property involved. Mere economic or financial hardship alone is not exceptional. Inconvenience, aesthetic considerations, physical handicaps, personal preferences, or the disapproval of one's neighbors likewise cannot, as a rule, qualify as an exceptional hardship. All of these problems can be resolved through other means without granting a variance, even if the alternative is more expensive, or requires the property owner to build elsewhere or put the parcel to a different use than originally intended.

HIGHEST ADJACENT GRADE: The highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

HISTORIC STRUCTURE: Any structure that is:

A. Listed individually in the national register of historic places (a listing maintained by the department of interior) or preliminarily determined by the secretary of the interior as meeting the requirements for individual listing on the national register;

B. Certified or preliminarily determined by the secretary of the interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the secretary to qualify as a registered historic district;

C. Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the secretary of the interior; or

D. Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either by an approved state program as determined by the secretary of the interior or directly by the secretary of the interior in states without approved programs.

LEVEE: A manmade structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control or divert the flow of water so as to provide protection from temporary flooding.

LEVEE SYSTEM: A flood protection system which consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accord with sound engineering practices.

LOWEST FLOOR: The lowest floor of the lowest enclosed area, including basement (see definition of Basement), for:

A. An unfinished or flood resistant enclosure below the lowest floor that is usable solely for parking of vehicles, building access or storage in an area other than a basement area, is not considered a building's lowest floor provided it conforms to applicable nonelevation design requirements, but not limited to:

1. The wet floodproofing standard in subsection 15.32.110C of this chapter;

2. The anchoring standards in subsection 15.32.110A of this chapter;

3. The construction materials and methods standards in subsection 15.32.110B of this chapter; and

4. The standards for utilities in section 15.32.120 of this chapter.

B. Residential structures, all subgrade enclosed areas are prohibited as they are considered to be basements (see definition of Basement). This prohibition includes below grade garages and storage areas.

MANUFACTURED HOME: A structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a "recreational vehicle".

MANUFACTURED HOME PARK OR SUBDIVISION: A parcel (or contiguous parcels) of land divided into two (2) or more manufactured home lots for rent or sale.

MARKET VALUE: The cost to replace the structure in new condition and adjusting that cost figure by the amount of depreciation which has accrued since the structure was constructed. The cost of replacement of the structure shall be based on a square foot cost factor determined by reference to a building cost estimation guide recognized by the building construction industry.

The amount of depreciation shall be determined by taking into account the age and physical deterioration of the structure and functional obsolescence as approved by the floodplain administrator, but shall not include economic or other forms of external obsolescence. Use of replacement costs or accrued depreciation factors different from those contained in recognized building cost estimation guides may be considered only if such factors are included in a report prepared by an independent professional appraiser and supported by written explanation of the differences.

MEAN SEA LEVEL: For purposes of the national flood insurance program, the national geodetic vertical datum (NGVD) of 1929 or other datum, to which base flood elevation shown on a community's flood insurance rate map are referenced.

MINIMUM NECESSARY: To afford relief with a minimum of deviation from the requirements of this chapter.

MUDSLIDE (MUDFLOW) PRONE AREA: An area with land surfaces and slopes of unconsolidated material where the history, geology, and climate indicate a potential for mudflow.

NEW CONSTRUCTION: For floodplain management purposes, means structures for which the "start of construction" commenced on or after the effective date of floodplain management regulations adopted by this community, and includes any subsequent improvements to such structures.

NEW MANUFACTURED HOME PARK OR SUBDIVISION: A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of floodplain management regulations adopted by this city.

OBSTRUCTION: Any dam, wall, wharf, embankment, levee, dike, pile, abutment, protection, excavation, channelization, bridge, conduit, culvert, building, wire, fence, rock, gravel, refuse, fill structure, vegetation or other material in, along, across or projection into any watercourse which may alter, impede, retard or change the direction and/or velocity of the flow of water, or due to its location, its propensity to snare or collect debris carried by the flow of water, or its likelihood of being carried downstream.

PUBLIC SAFETY AND NUISANCE: As related to section 15.32.190 of this chapter, means that the granting of a variance must not result in anything which is injurious to safety or health of an entire community or neighborhood, or any considerable number of persons, or unlawfully obstructs the free passage or use, in the customary manner, of any navigable lake or river, bay, stream, canal, or basin.

RECREATIONAL VEHICLE: A vehicle which is:

A. Built on a single chassis;

B. Four hundred (400) square feet or less when measured at the largest horizontal projection;

C. Designed to be self-propelled or permanently towable by a light duty truck; and

D. Designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

REGULATORY FLOODWAY: ~~The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot (1').~~ Channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

REMEDY A VIOLATION: To bring a structure or other development into compliance with state and local floodplain management regulations, or, if that is not possible, to reduce the impacts of its noncompliance. Ways that impacts may be reduced include protecting the structure or other affected development from flood damages, implementing the enforcement provisions of this chapter or otherwise deterring future similar violations, or reducing state or federal financial exposure with regard to the structure or other development.

RIVERINE: Relating to, formed by, or resembling a river (including tributaries), stream or brook.

SPECIAL FLOOD HAZARD AREA (SFHA): An area in the floodplain subject to a one percent (1%) or greater chance of flooding in any given year and is shown on an FHBM or FIRM as zone A, AO, A1-30, AE, A99, or AH.

START OF CONSTRUCTION: Includes substantial improvement, and other proposed new development and means the date the building permit was issued; provided, the actual start of construction, repair, reconstruction, rehabilitation, addition, placement or other improvement was within one hundred eighty (180) days of the permit date. The "actual start" means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of manufactured home on a foundation. "Permanent construction" does not include land preparation, such as clearing, grading and filling, the installation of streets and/or walkways; nor does it include the excavation of basements, footings, piers or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

STRUCTURE: A walled and roofed building that is principally above ground; including a gas or liquid storage tank or a manufactured home.

SUBSTANTIAL DAMAGE: Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed fifty percent (50%) of the market value of the structure before the damage occurred.

SUBSTANTIAL IMPROVEMENT: Any reconstruction, rehabilitation, addition, or other proposed new development of a structure, the cost of which equals or exceeds fifty percent

(50%) of the market value of the structure before the start of construction of the improvement. This term includes structures which have incurred substantial damage, regardless of the actual repair work performed. The term does not, however, include either:

A. Any project for improvement of a structure to correct existing violations or state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions; or

B. Any alteration of a historic structure, provided that the alteration will not preclude the structure's continued designation as a historic structure.

VARIANCE: A grant of relief from the requirements of this chapter which permits construction in a manner that would otherwise be prohibited by this chapter.

VIOLATION: The failure of a structure or other development to be fully compliant with this chapter. A structure or other development without the elevation certificate, other certification, or other evidence of compliance required by this chapter is presumed to be in violation until such time as that documentation is provided.

WATER SURFACE ELEVATION: The height, in relation to the national geodetic vertical datum (NGVD) of 1929 (or the datum, where specified), of floods of various magnitudes and frequencies in the floodplains of coastal or riverine areas.

WATERCOURSE: A lake, river, creek, stream, wash, arroyo, channel or other topographic feature on or over which waters flow at least periodically. Watercourse includes specifically designated areas in which substantial flood damage may occur."

SECTION 2. Section 15.32.040 of Chapter 15.32 of the Redlands Municipal Code, entitled "Establishing the Areas of Special Flood Hazard," is hereby amended to read as follows:

"15.32.040: ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD:

The areas of special flood hazard identified by the federal insurance administration (FIA) of the federal emergency management agency (FEMA) in the ~~flood insurance study (FIS) dated July 3, 1978, and the flood insurance rate map (FIRMs) and flood boundary and floodway maps (FBFMs), dated January 3, 1979,~~ "Flood Insurance Study (FIS) for San Bernardino County, California and Incorporated Areas" dated January 17, 1997, with accompanying flood insurance rate maps (FIRMs) and flood boundary and floodway maps (FBFMs), dated January 3, 1979, and all subsequent amendments and/or revisions, are adopted by reference and declared to be a part of this chapter. This flood insurance study (FIS) and attendant mapping is the minimum area of applicability of this chapter and may be supplemented by studies for other areas which allow implementation of this chapter and which are recommended to the city council by the chief building official. The study, FIRMs and FBFMs are on file at 35 Cajon Street, Suite 20, department of building and safety."

SECTION 3. Section 15.32.080 of Chapter 15.32 of the Redlands Municipal Code, entitled "Warning and Disclaimer of Liability," is hereby amended to read as follows:

"15.32.080: WARNING AND DISCLAIMER OF LIABILITY:

The degree of flood protection required by this chapter is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on occasions and flood heights may be increased by manmade or natural causes. This chapter does not imply that land outside the areas of special flood hazards, or uses permitted within such areas will be free from flooding or flood damages. This chapter shall not create liability on the part of the city, any elected official, officer or employee thereof, the state of California, or the federal insurance administration, federal emergency management agency, for any flood damages that result from reliance on this chapter or any rule or regulation made pursuant to this chapter.
If any section, provision or portion of the ordinance is deemed unconstitutional or invalid by a court, the remainder of the ordinance shall be effective."

SECTION 4. Section 15.32.100 of Chapter 15.32 of the Redlands Municipal Code, entitled "Chief Building Official; Duties and Responsibilities," is hereby amended to read as follows:

"15.32.100: CHIEF BUILDING OFFICIAL; DUTIES AND RESPONSIBILITIES:
The chief building official, as the designated floodplain administrator, shall administer, implement, and enforce this chapter by granting or denying development permits in accordance with its provisions and the chief building official duties and responsibilities shall include, but not be limited to:

A. Permit Review:
   1. Review all development permits to determine that the permit requirements of this chapter have been satisfied;
   2. Ensure that all other state and federal permits have been obtained;
   3. Determine that the site is reasonably safe from flooding; and
   4. ~~The proposed development does not adversely affect the carrying capacity of areas where base flood elevations have been determined but a floodway has not been designated. For purposes of this chapter, "adversely affects" means that the cumulative effect of the proposed development when combined with all other existing and anticipated development will increase the water surface elevation of the base flood more than one foot (1') at any point.~~
   The proposed development within zones A1-30 and AE without a designated floodway does not adversely affect the carrying capacity of areas where base flood elevations have been determined but a floodway has not been designated. For purposes of this chapter, "adversely affects" means that the cumulative effect of the proposed development when combined with all other existing and anticipated development will increase the water surface elevation of the base flood more than one foot (1') at any point.

B. Review, Use And Development Of Other Base Flood Data:

1. When base flood elevation data has not been provided in accordance with section 15.32.040 of this chapter, the chief building official shall obtain, review and utilize any base flood elevation and floodway data available from a federal, state or other sources, or if no base flood elevation data is available from a federal or state agency or other source, in order to administer section 15.32.110 of this chapter. Any such information shall be submitted to the city for adoption; or

2. If no base flood elevation data is available from a federal or state agency or other source, then a base flood elevation shall be obtained using one of the two (2) methods from the FEMA publication "Managing Floodplain Development In Approximate Zone A Areas-A Guide Of Obtaining And Developing Base (100-Year) Flood Elevations" dated July 1995, in order to administer section 15.32.110 of this chapter.

a. Simplified method:
(1) 100-year or base flood discharge shall be obtained using the appropriate regression equation found in a U.S. geological survey publication, or the discharge-drainage area method; and
(2) Base flood elevation shall be obtained using the Quick-2 computer program developed by FEMA; or

b. Detail method:
(1) 100-year or base flood discharge shall be obtained using the U.S. army corps of engineers' HEC-HMS computer program; and
(2) Base flood elevation shall be obtained using the U.S. army corps of engineers' HEC-RAS computer program.

C. Notification Of Other Agencies:

1. In alteration or relocation of a watercourse:
a. Notify adjacent communities and the California department of water resources prior to alteration or relocation;
b. Submit evidence of such notification to the FEMA; and
c. Assure that the flood carrying capacity within the altered or relocated portion of said watercourse is maintained.

2. Base Flood Elevation Changes Due To Physical Alterations:
a. Within six (6) months of information becoming available or project completion, whichever comes first, the floodplain administrator shall submit or assure that the permit applicant submits technical or scientific data to FEMA for a Letter of Map Revision (LOMR).
b. All LOMR’s for flood control projects are approved prior to the issuance of building permits. Building permits must not be issued based on Conditional Letters of Map Revision (CLOMR’s). Approved CLOMR’s allow construction of the proposed flood control project and land preparation as specified in the “start of construction” definition. Such submissions are necessary so that upon confirmation of those physical changes affecting flooding conditions, risk premium rates and

floodplain management requirements are based on current data.

3. Changes In Corporate Boundaries:
   a. Notify FEMA in writing whenever the corporate boundaries have been modified by annexation or other means and include a copy of a map of the community clearly delineating the new corporate limits.

D. Documentation Of Floodplain Development: Obtain and maintain for public inspection and make available as needed the following:

1. Certification required by sections 15.32.110 and 15.32.140 of this chapter (lowest floor elevations);
2. Certification required by subsection 15.32.110C4 of this chapter (elevation or floodproofing of nonresidential structures);
3. Certification of elevation required by subsection 15.32.110C5 of this chapter (wet floodproofing standards);
4. Certification of elevation required by section 15.32.130, "Subdivision Standards", of this chapter;
5. Certification required by section 15.32.160 of this chapter (floodway encroachments);
6. Reports required by section 15.32.170 of this chapter (mudflow standards).

E. Map Determinations: Make interpretations, where needed, as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions). Any person contesting the location of a boundary shall be given a reasonable opportunity to appeal the interpretation as provided in sections 15.32.180 and 15.32.190 of this chapter.

F. Remedial Action: Take action to remedy violations of this chapter."

SECTION 5. Section 15.32.110 of Chapter 15.32 of the Redlands Municipal Code, entitled "Construction Standards," is hereby amended to read as follows:

"15.32.110: CONSTRUCTION STANDARDS:

In all areas of special flood hazards the following standards are required:

A. Anchoring:
   1. All new construction and substantial improvements shall be anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy.
   2. All manufactured homes shall meet the anchoring standards of section 15.32.140 of this chapter.

B. Construction Materials And Methods:
   1. All new construction and substantial improvements shall be constructed with flood resistant materials and utility equipment resistant to flood damage;
   2. All new construction and substantial improvements shall be constructed using

methods and practices that minimize flood damage;

3. All new construction and substantial improvements shall be constructed with electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding~~;~~ ~~and~~ by elevating said equipment by at least one foot (1') above the base flood elevation; and

4. If within zone AH or AO, adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures.

C. Elevation And Floodproofing:

1. Residential construction, new or substantial improvement of any structure in zone AE, AH, or A1-30 shall have the lowest floor, including basement, elevated two feet (2') above the base flood elevation. Upon the completion of the structure the elevation of the lowest floor including basement shall be certified by a registered professional engineer or surveyor, or verified by the chief building official to be properly elevated.

2. Residential construction, new or substantial improvement, of any structure in zone AO shall have the lowest floor, including basement, elevated above the highest adjacent grade to a height exceeding the depth number specified in feet on the FIRM by at least two feet (2'), or elevated at least four feet (4') above the highest adjacent grade if no depth number is specified. Upon the completion of the structure, the elevation of the lowest floor including basement shall be certified by a registered professional engineer or surveyor, or by the chief building official to be properly elevated.

3. Residential construction, new or substantial improvement of any structure in zone A shall have the lowest floor, including basement, be elevated at least two feet (2') above the base flood elevation. Upon the completion of the structure, the elevation of the lowest floor including basement shall be certified by a registered professional engineer or surveyor, or by the chief building official to be properly elevated.

4. ~~Nonresidential construction, new or substantial improvement, shall either be elevated in conformance with subsection C1 or C2 of this section or together with attendant utility and sanitary facilities be floodproofed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water, have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy, and be certified by a registered professional engineer or architect that the standards of this subsection are satisfied. Such certifications shall be provided to the chief building official.~~ Nonresidential construction, new or substantial improvement, in AO zones shall either be elevated in conformance with subsection C1 or C2 of this section or together with attendant utility and sanitary facilities be floodproofed to at least two feet (2') above the BFE so that below this level the structure is watertight with walls substantially impermeable to the passage of water, have structural

components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy, and be certified by a registered professional engineer or architect that the standards of this subsection are satisfied. Such certifications shall be provided to the chief building official.

5. All new construction and substantial improvements, that fully enclose areas below the lowest floor (excluding basements) that are usable solely for parking of vehicles, building access or storage, and which are subject to flooding, shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement shall either be certified by a registered professional engineer or architect and must meet or exceed the following minimum criteria:

a. Have a minimum of two (2) openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding. The bottom of all openings shall be no higher than one foot (1') above grade. Openings may be equipped with screens, louvers, valves or other coverings or devices; provided, that they permit the automatic entry and exit of floodwaters; or
b. Be certified by a registered professional engineer or architect.

6. Manufactured homes shall satisfy the standards in section 15.32.140 of this chapter."

SECTION 6. Section 15.32.130 of Chapter 15.32 of the Redlands Municipal Code, entitled "Subdivision Standards," is hereby amended to read as follows:

"15.32.130: SUBDIVISION STANDARDS:

A. All preliminary subdivision proposals greater than 50 lots or 5 acres shall identify the special flood hazard area and the elevation of the base flood.

B. All final subdivision plans shall provide the elevation of proposed structures and pads. If the site is filled above the base flood elevation, the lowest floor and pad elevation shall be certified by a registered professional engineer or surveyor and provided to the chief building official.

C. All subdivision proposals shall be consistent with the need to minimize flood damage.

D. All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize flood damage by dry floodproofing and elevating equipment by at least one foot (1') above the base flood elevation.

E. All subdivisions shall provide adequate drainage to reduce exposure to flood hazards."

SECTION 7. Section 15.32.140 of Chapter 15.32 of the Redlands Municipal Code,

entitled “Standards for Manufactured Homes,” is hereby amended to read as follows:

“15.32.140: STANDARDS FOR MANUFACTURED HOMES:

A. All manufactured homes that are placed or substantially improved within zones A1-30, AH, and AE on the community's flood insurance rate map, on sites located: 1) outside of a manufactured home park or subdivision; 2) in a new manufactured home park or subdivision; 3) in an expansion to an existing manufactured home park or subdivision; 4) in an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood, shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated to at least two feet (2') above the base flood elevation and be securely fastened to an adequately anchored foundation system to resist flotation collapse and lateral movement.

B. All manufactured homes to be placed or substantially improved on sites in an existing manufactured home park or subdivision within zones A1-30, AH, and AE on the community's flood insurance rate map that are not subject to the provisions of subsection A of this section will be fastened to an adequately anchored foundation system to resist flotation, collapse, and lateral movement, and to be elevated so that either:

1. The lowest floor of the manufactured home is at least two feet (2') above the base flood elevation~~; or~~.

~~2. The manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than thirty six inches (36") in height above grade. Upon completion of the structure, the elevation of the lowest floor including basement shall be certified by a registered professional engineer or surveyor, and verified by the city building inspector to be properly elevated. Such certification and verification shall be provided to the chief building official.~~”

SECTION 8. Immediate threat to public health, safety, and welfare.
Based on the findings herein, this Urgency Ordinance is adopted pursuant to California Government Code section 36937 to address an immediate threat to the public health, safety, and welfare. The City Council has determined that failing to immediately adopt the necessary updates to Chapter 15.32 (Flood Damage Prevention) by October 30, 2025, will result in the loss of eligibility for the National Flood Insurance Program, and such loss of eligibility and insurance presents an immediate threat to the public health, safety, and welfare of persons and properties within the City of Redlands.

SECTION 9. Urgency Ordinance. In accordance with California Government Code sections 36934 and 36937, this ordinance is an Urgency Ordinance and shall take effect and be enforced immediately upon adoption.

SECTION 10. Conflicting Provisions. For the term of this ordinance, the provisions of this ordinance shall govern. To the extent that there is any conflict between the provisions of this ordinance and the provisions of the City’s Municipal Code, or any ordinance, resolution, or

policy of the City, all such conflicting provisions shall be suspended or modified to the extent necessary to implement the provisions of this Urgency Ordinance.

SECTION 11. Environmental Determination. The City Council has reviewed the matter and, based upon the facts and information contained in the staff report, administrative record, and written and oral testimony, hereby finds that this ordinance is not subject to the California Environmental Quality Act (CEQA) pursuant to Sections 15061(b)(3) and 15378(b)(5) of the State CEQA Guidelines, in that it will not result in a direct or reasonably foreseeable indirect physical change on the environment nor have a significant impact on the environment.

SECTION 12. Severability. If any section, subsection, subdivision, sentence, clause, phrase, or portion of this Urgency Ordinance for any reason is held to be invalid or unconstitutional by the decision of any court of competent jurisdiction, such decision shall not affect the validity of the remaining portions of this Urgency Ordinance. The City Council hereby declares that it would have adopted this Urgency Ordinance, and each section, subsection, subdivision, sentence, clause, phrase, or portion thereof, irrespective of the fact that any one or more sections, subsections, subdivisions, sentences, clauses, phrases, or portions thereof be declared invalid or unconstitutional.

SECTION 13. Publication and Effective Date. This Urgency Ordinance is enacted pursuant to the authority conferred upon the City Council by Government Code Sections 36934 and 36937 and shall be in full force and effect upon its adoption by a four-fifths (4/5) vote of the City Council. The City Clerk shall cause this Urgency Ordinance to be published once in a newspaper of general circulation within fifteen (15) days after its adoption.

_____

Mario Saucedo, Mayor

ATTEST:

_____
Jeanne Donaldson, City Clerk

I, Jeanne Donaldson, City Clerk of the City of Redlands, hereby certify that the foregoing urgency ordinance was duly adopted by the City Council at a regular meeting thereof held on the 21st day of October, 2025.

AYES:
NOES:
ABSENT:
ABSTAINED:

_____
Jeanne Donaldson, City Clerk

ORDINANCE NO. 2991

AN URGENCY ORDINANCE OF THE CITY OF REDLANDS ADOPTING IMMEDIATE CODE TEXT AMENDMENTS TO TITLE 15, CHAPTER 15.32, OF THE REDLANDS MUNICIPAL CODE RELATING TO FLOOD DAMAGE PREVENTION AND FLOODPLAIN MANAGEMENT; AND DECLARING AN URGENCY FOR THE PURPOSE OF PROTECTING THE PUBLIC HEALTH, SAFETY, AND GENERAL WELFARE FOR PERSONS AND PROPERTIES WITHIN THE CITY OF REDLANDS.

WHEREAS, on September 20, 2016, the City Council of the City of Redlands adopted Ordinance No. 2837 updating Title 15, Chapter 15.32 (Flood Damage Prevention), of the Redlands Municipal Code; and

WHEREAS, the City of Redlands desires to update Title 15, Chapter 15.32 (Flood Damage Prevention), of the Redlands Municipal Code to align with current applicable State and/or Federal guidance and regulations; and

WHEREAS, the City of Redlands maintains current eligibility and participation in the National Flood Insurance Program; and

WHEREAS, immediate adoption of certain necessary updates to Redlands Municipal Code Title 15, Chapter 15.32 (Flood Damage Prevention) by October 30, 2025, is necessary to maintain current eligibility for the National Flood Insurance Program; and

WHEREAS, should the City of Redlands lose its participation in the National Flood Insurance Program, such loss of insurance will result in loss of community eligibility for discounted flood insurance under the National Flood Insurance Program, and therefore, present an immediate threat to the public health, safety, and welfare of persons and properties within the City; and

WHEREAS, California Government Code section 36937 authorizes the City Council to introduce and adopt an ordinance it declares to be necessary as an urgency measure to preserve the public peace, health, and safety at one and the same meeting if passed by at least four-fifths (4/5) vote of the City Council; and

WHEREAS, the City of Redlands is in compliance with the procedural requirements of California Government Code section 36937 pertaining to the adoption of this Urgency Ordinance; and

WHEREAS, the City Council of the City of Redlands makes the following findings regarding the purpose and intent of this urgency ordinance:

A. The National Flood Insurance Act of 1968 was enacted by title XIII of the Housing & Urban Development Act of 1968 (“Act”) to provide previously unavailable flood insurance protection to property owners in flood-prone areas. Under the Act and the

regulations promulgated under the Act, specifically 44 CFR § 59.2, in order to qualify for the sale of federally-subsidized flood insurance, the City must adopt and submit to the Federal Insurance Administrator an ordinance adopting flood plain management regulations that satisfy the requirements of 44 CFR Part 60 and that are designed to reduce or avoid future flood, mudslide or flood-related erosion damages and include enforcement provisions.

B. While the City of Redlands has adopted the most recent version of the California Building Code and has an ordinance for flood plain management regulations that previously satisfied the prerequisites for the National Flood Insurance Program or the regulations set forth at 44 CFR Part 60, amendments to the City's ordinance are required by October 30, 2025, to continue to satisfy the National Flood Insurance Program or the regulations set forth at 44 CFR Part 60.

C. Pursuant to 44 CFR § 59.24, a government entity that is otherwise eligible for the sale of federal flood insurance shall be subject to suspension from the National Flood Insurance Program for failing to submit copies of adequate flood plain management regulations meeting the minimum requirements of 4 CFR Part 60. The Federal Insurance Administrator has provided a deadline of October 30, 2025, for the City of Redlands to adopt the required municipal code text amendment(s) to update the applicable flood plain management regulations contained in the Redlands Municipal Code.

D. The City Council finds that the impending loss of community eligibility for discounted flood insurance under the National Flood Insurance Program poses a current and immediate threat to the public health, safety, and welfare presented by floods and related conditions during the upcoming rainy season(s). In the absence of this Urgency Ordinance's immediate effectiveness, the City would be unable to secure eligibility to purchase discounted federal flood insurance for affected community members, as well as to protect the public health, safety, and welfare from the potential adverse effects of lack of insurance coverage to recover from a flood or flood-related disaster.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF REDLANDS DOES ORDAIN AS FOLLOWS:

SECTION 1. Section 15.32.020 of Chapter 15.32 of the Redlands Municipal Code, entitled "Definitions," is hereby amended to read as follows:

"15.32.020: DEFINITIONS:

The following words shall have the meanings ascribed to them:

ACCESSORY STRUCTURE: A structure that is accessory to and incidental to that of the dwelling(s) and that is located on the same structure.

ACCESSORY USE: A use which is incidental and subordinate to the principal use of the parcel of land on which it is located.

ALLUVIAL FAN: A geomorphologic feature characterized by a cone or fan shaped deposit of boulders, gravel, and fine sediments that have been eroded from mountain slopes, transported by flood flows, and then deposited on the valley floors, and which is subject to flash flooding, high velocity flows, debris flows, erosion, sediment movement and deposition, and channel migration.

APEX: The point of highest elevation on an alluvial fan, which on undisturbed fans is generally the point where the major stream that formed the fan emerges from the mountain front.

APPEAL: A request for a review of the chief building official's interpretation of any provision of this chapter.

AREA OF SHALLOW FLOODING: A designated AO or AH zone on the flood insurance rate map (FIRM) where the base flood depths range from one to three feet (3'), a clearly defined channel does not exist, the path of flooding is unpredictable and indeterminate, and velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

ATTENDANT UTILITIES AND EQUIPMENT: Utilities, mechanical. Electrical, fuel gas, plumbing, HVAC, and related equipment, as well as services associated with new construction and substantial improvements.

BASE FLOOD: A flood which has a one percent (1%) chance of being equaled or exceeded in any given year (also called the "100-year flood"). Base flood is the term used throughout this chapter.

BASE FLOOD ELEVATION (BFE): Elevation of flooding, including wave height, have a one percent (1%) chance of being equaled or exceeded in any given year.

BASEMENT: Any area of the building having its floor subgrade (below ground level) on all sides.

DEVELOPMENT: Any manmade change to improved or unimproved real estate, including, but not limited to, buildings, structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.

DRY FLOODPROOFING: A combination of measures that results in a structure, including the attendant utilities and equipment, being watertight with all elements substantially impermeable and with structural components having the capacity to resist flood loads.

ENCROACHMENT: The advance or infringement of uses, plant growth, fill, excavation, buildings, permanent structures or development into a floodplain which may impede or alter the flow capacity of a floodplain.

EXISTING MANUFACTURED HOME PARK OR SUBDIVISION: A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the floodplain management regulations adopted by a community.

EXPANSION TO AN EXISTING MANUFACTURED HOME PARK OR SUBDIVISION:

The preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads).

FLOOD BOUNDARY AND FLOODWAY MAP (FBFM): The official map on which the federal emergency management agency or federal insurance administration has delineated both the areas of special flood hazard and the floodway.

FLOOD, FLOODING, OR FLOODWATER:

A. A general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland or tidal waters, the unusual and rapid accumulation or runoff of surface waters from any source, and/or mudslides (i.e., mudflows); and

B. The condition resulting from flood related erosion.

FLOOD HAZARD BOUNDARY MAP: The official map on which the federal emergency management agency or federal insurance administration has delineated the areas of flood hazards.

FLOOD INSURANCE RATE MAP (FIRM): The official map on which the federal emergency management agency or federal insurance administration has delineated both the areas of special flood hazards and the risk of premium zones applicable to the community.

FLOOD INSURANCE STUDY: The official report provided by the federal insurance administration that includes flood profiles, the flood insurance rate map, the flood boundary and floodway map and the water surface elevation of the base flood.

FLOODPLAIN ADMINISTRATOR: The city's chief building official.

FLOODPLAIN MANAGEMENT: The operation of an overall program of corrective and preventive measures for reducing flood damage and preserving and enhancing, where possible, natural resources in the floodplain, including, but not limited to, emergency preparedness plans, flood control works, floodplain management regulations and open space plans.

FLOODPLAIN MANAGEMENT REGULATIONS: This chapter, subdivision regulations, building codes, health regulations, ordinances (such as grading and erosion control) and other applications of police power regulations which control development in flood prone areas. This term describes federal, state or local regulations, in any combination thereof, which provide standards for preventing and reducing flood loss and damage.

FLOODPLAIN OR FLOOD PRONE AREA: Any land area susceptible to being inundated by water from any source (see definition of Flood, Flooding, Or Floodwater).

FLOODPROOFING: Any combination of structural and nonstructural additions, changes or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

FLOODWAY: The channel of a river or other watercourse and the adjacent land areas that

must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot (1').

FLOODWAY FRINGE: That area of the floodplain on either side of the "regulatory floodway" where encroachment may be permitted.

FRAUD AND VICTIMIZATION: As related to sections 15.32.180 and 15.32.190 of this chapter, means that the variance granted must not cause fraud on or victimization of the public. In examining this requirement, the city will consider the fact that every newly constructed building adds to government responsibilities and remains a part of the city for fifty (50) to one hundred (100) years. Buildings that are permitted to be constructed below the base flood elevation are subject during all those years to increased risk of damage from floods, while future owners of the property and the city as a whole are subject to all the costs, inconvenience, danger, and suffering that those increased flood damages bring. In addition, future owners may purchase the property, unaware that it is subject to potential flood damage, and can be insured only at very high flood insurance rates.

FUNCTIONALLY DEPENDENT USE: A use which cannot perform its intended purpose unless it is located or carried out in close proximity to water.

GOVERNING BODY: The city council of the city of Redlands that is empowered to adopt and implement regulations to provide for the public health, safety and general welfare of its citizenry.

HARDSHIP: As related to section 15.32.190 of this chapter, means the exceptional hardship that would result from a failure to grant a requested variance. The city council requires that the variance be exceptional, unusual, and peculiar to the property involved. Mere economic or financial hardship alone is not exceptional. Inconvenience, aesthetic considerations, physical handicaps, personal preferences, or the disapproval of one's neighbors likewise cannot, as a rule, qualify as an exceptional hardship. All of these problems can be resolved through other means without granting a variance, even if the alternative is more expensive, or requires the property owner to build elsewhere or put the parcel to a different use than originally intended.

HIGHEST ADJACENT GRADE: The highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

HISTORIC STRUCTURE: Any structure that is:

A. Listed individually in the national register of historic places (a listing maintained by the department of interior) or preliminarily determined by the secretary of the interior as meeting the requirements for individual listing on the national register;

B. Certified or preliminarily determined by the secretary of the interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the secretary to qualify as a registered historic district;

C. Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the secretary of the interior; or

D. Individually listed on a local inventory of historic places in communities with

historic preservation programs that have been certified either by an approved state program as determined by the secretary of the interior or directly by the secretary of the interior in states without approved programs.

LEVEE: A manmade structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control or divert the flow of water so as to provide protection from temporary flooding.

LEVEE SYSTEM: A flood protection system which consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accord with sound engineering practices.

LOWEST FLOOR: The lowest floor of the lowest enclosed area, including basement (see definition of Basement), for:

A. An unfinished or flood resistant enclosure below the lowest floor that is usable solely for parking of vehicles, building access or storage in an area other than a basement area, is not considered a building's lowest floor provided it conforms to applicable nonelevation design requirements, but not limited to:

1. The wet floodproofing standard in subsection 15.32.110C of this chapter;

2. The anchoring standards in subsection 15.32.110A of this chapter;

3. The construction materials and methods standards in subsection 15.32.110B of this chapter; and

4. The standards for utilities in section 15.32.120 of this chapter.

B. Residential structures, all subgrade enclosed areas are prohibited as they are considered to be basements (see definition of Basement). This prohibition includes below grade garages and storage areas.

MANUFACTURED HOME: A structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a "recreational vehicle".

MANUFACTURED HOME PARK OR SUBDIVISION: A parcel (or contiguous parcels) of land divided into two (2) or more manufactured home lots for rent or sale.

MARKET VALUE: The cost to replace the structure in new condition and adjusting that cost figure by the amount of depreciation which has accrued since the structure was constructed. The cost of replacement of the structure shall be based on a square foot cost factor determined by reference to a building cost estimation guide recognized by the building construction industry. The amount of depreciation shall be determined by taking into account the age and physical deterioration of the structure and functional obsolescence as approved by the floodplain administrator, but shall not include economic or other forms of external obsolescence. Use of replacement costs or accrued depreciation factors different from those contained in recognized

building cost estimation guides may be considered only if such factors are included in a report prepared by an independent professional appraiser and supported by written explanation of the differences.

MEAN SEA LEVEL: For purposes of the national flood insurance program, the national geodetic vertical datum (NGVD) of 1929 or other datum, to which base flood elevation shown on a community's flood insurance rate map are referenced.

MINIMUM NECESSARY: To afford relief with a minimum of deviation from the requirements of this chapter.

MUDSLIDE (MUDFLOW) PRONE AREA: An area with land surfaces and slopes of unconsolidated material where the history, geology, and climate indicate a potential for mudflow.

NEW CONSTRUCTION: For floodplain management purposes, means structures for which the "start of construction" commenced on or after the effective date of floodplain management regulations adopted by this community, and includes any subsequent improvements to such structures.

NEW MANUFACTURED HOME PARK OR SUBDIVISION: A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of floodplain management regulations adopted by this city.

OBSTRUCTION: Any dam, wall, wharf, embankment, levee, dike, pile, abutment, protection, excavation, channelization, bridge, conduit, culvert, building, wire, fence, rock, gravel, refuse, fill structure, vegetation or other material in, along, across or projection into any watercourse which may alter, impede, retard or change the direction and/or velocity of the flow of water, or due to its location, its propensity to snare or collect debris carried by the flow of water, or its likelihood of being carried downstream.

PUBLIC SAFETY AND NUISANCE: As related to section 15.32.190 of this chapter, means that the granting of a variance must not result in anything which is injurious to safety or health of an entire community or neighborhood, or any considerable number of persons, or unlawfully obstructs the free passage or use, in the customary manner, of any navigable lake or river, bay, stream, canal, or basin.

RECREATIONAL VEHICLE: A vehicle which is:

A. Built on a single chassis;

B. Four hundred (400) square feet or less when measured at the largest horizontal projection;

C. Designed to be self-propelled or permanently towable by a light duty truck; and

D. Designed primarily not for use as a permanent dwelling but as temporary living

quarters for recreational, camping, travel, or seasonal use.

REGULATORY FLOODWAY: Channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

REMEDY A VIOLATION: To bring a structure or other development into compliance with state and local floodplain management regulations, or, if that is not possible, to reduce the impacts of its noncompliance. Ways that impacts may be reduced include protecting the structure or other affected development from flood damages, implementing the enforcement provisions of this chapter or otherwise deterring future similar violations, or reducing state or federal financial exposure with regard to the structure or other development.

RIVERINE: Relating to, formed by, or resembling a river (including tributaries), stream or brook.

SPECIAL FLOOD HAZARD AREA (SFHA): An area in the floodplain subject to a one percent (1%) or greater chance of flooding in any given year and is shown on an FHBM or FIRM as zone A, AO, A1-30, AE, A99, or AH.

START OF CONSTRUCTION: Includes substantial improvement, and other proposed new development and means the date the building permit was issued; provided, the actual start of construction, repair, reconstruction, rehabilitation, addition, placement or other improvement was within one hundred eighty (180) days of the permit date. The "actual start" means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of manufactured home on a foundation. "Permanent construction" does not include land preparation, such as clearing, grading and filling, the installation of streets and/or walkways; nor does it include the excavation of basements, footings, piers or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

STRUCTURE: A walled and roofed building that is principally above ground; including a gas or liquid storage tank or a manufactured home.

SUBSTANTIAL DAMAGE: Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed fifty percent (50%) of the market value of the structure before the damage occurred.

SUBSTANTIAL IMPROVEMENT: Any reconstruction, rehabilitation, addition, or other proposed new development of a structure, the cost of which equals or exceeds fifty percent (50%) of the market value of the structure before the start of construction of the improvement. This term includes structures which have incurred substantial damage, regardless of the actual repair work performed. The term does not, however, include either:

A. Any project for improvement of a structure to correct existing violations or state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions; or

B. Any alteration of a historic structure, provided that the alteration will not preclude the structure's continued designation as a historic structure.

VARIANCE: A grant of relief from the requirements of this chapter which permits construction in a manner that would otherwise be prohibited by this chapter.

VIOLATION: The failure of a structure or other development to be fully compliant with this chapter. A structure or other development without the elevation certificate, other certification, or other evidence of compliance required by this chapter is presumed to be in violation until such time as that documentation is provided.

WATER SURFACE ELEVATION: The height, in relation to the national geodetic vertical datum (NGVD) of 1929 (or the datum, where specified), of floods of various magnitudes and frequencies in the floodplains of coastal or riverine areas.

WATERCOURSE: A lake, river, creek, stream, wash, arroyo, channel or other topographic feature on or over which waters flow at least periodically. Watercourse includes specifically designated areas in which substantial flood damage may occur."

SECTION 2. Section 15.32.040 of Chapter 15.32 of the Redlands Municipal Code, entitled "Establishing the Areas of Special Flood Hazard," is hereby amended to read as follows:

"15.32.040: ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD:

The areas of special flood hazard identified by the federal insurance administration (FIA) of the federal emergency management agency (FEMA) in the "Flood Insurance Study (FIS) for San Bernardino County, California and Incorporated Areas" dated January 17, 1997, with accompanying flood insurance rate maps (FIRMs) and flood boundary and floodway maps (FBFMs), dated January 3, 1979, and all subsequent amendments and/or revisions, are adopted by reference and declared to be a part of this chapter. This flood insurance study (FIS) and attendant mapping is the minimum area of applicability of this chapter and may be supplemented by studies for other areas which allow implementation of this chapter and which are recommended to the city council by the chief building official. The study, FIRMs and FBFMs are on file at 35 Cajon Street, Suite 20, department of building and safety."

SECTION 3. Section 15.32.080 of Chapter 15.32 of the Redlands Municipal Code, entitled "Warning and Disclaimer of Liability," is hereby amended to read as follows:

"15.32.080: WARNING AND DISCLAIMER OF LIABILITY:

The degree of flood protection required by this chapter is considered reasonable for regulatory

purposes and is based on scientific and engineering considerations. Larger floods can and will occur on occasions and flood heights may be increased by manmade or natural causes. This chapter does not imply that land outside the areas of special flood hazards, or uses permitted within such areas will be free from flooding or flood damages. This chapter shall not create liability on the part of the city, any elected official, officer or employee thereof, the state of California, or the federal insurance administration, federal emergency management agency, for any flood damages that result from reliance on this chapter or any rule or regulation made pursuant to this chapter.

If any section, provision or portion of the ordinance is deemed unconstitutional or invalid by a court, the remainder of the ordinance shall be effective."

SECTION 4. Section 15.32.100 of the Redlands Municipal Code, entitled "Chief Building Official; Duties and Responsibilities," is hereby amended to read as follows:

"15.32.100: CHIEF BUILDING OFFICIAL; DUTIES AND RESPONSIBILITIES:
The chief building official, as the designated floodplain administrator, shall administer, implement, and enforce this chapter by granting or denying development permits in accordance with its provisions and the chief building official duties and responsibilities shall include, but not be limited to:

A. Permit Review:
   1. Review all development permits to determine that the permit requirements of this chapter have been satisfied;
   2. Ensure that all other state and federal permits have been obtained;
   3. Determine that the site is reasonably safe from flooding; and
   4. The proposed development within zones A1-30 and AE without a designated floodway does not adversely affect the carrying capacity of areas where base flood elevations have been determined but a floodway has not been designated. For purposes of this chapter, "adversely affects" means that the cumulative effect of the proposed development when combined with all other existing and anticipated development will increase the water surface elevation of the base flood more than one foot (1') at any point.

B. Review, Use And Development Of Other Base Flood Data:

1. When base flood elevation data has not been provided in accordance with section 15.32.040 of this chapter, the chief building official shall obtain, review and utilize any base flood elevation and floodway data available from a federal, state or other sources, or if no base flood elevation data is available from a federal or state agency or other source, in order to administer section 15.32.110 of this chapter. Any such information shall be submitted to the city for adoption; or

2. If no base flood elevation data is available from a federal or state agency or other source, then a base flood elevation shall be obtained using one of the two (2) methods from the FEMA publication "Managing Floodplain Development In Approximate Zone A Areas-A Guide Of Obtaining And Developing Base (100-Year) Flood Elevations" dated July 1995, in order to administer section 15.32.110 of this

chapter.

a. Simplified method:
(1) 100-year or base flood discharge shall be obtained using the appropriate regression equation found in a U.S. geological survey publication, or the discharge-drainage area method; and
(2) Base flood elevation shall be obtained using the Quick-2 computer program developed by FEMA; or

b. Detail method:
(1) 100-year or base flood discharge shall be obtained using the U.S. army corps of engineers' HEC-HMS computer program; and
(2) Base flood elevation shall be obtained using the U.S. army corps of engineers' HEC-RAS computer program.

C. Notification Of Other Agencies:

1. In alteration or relocation of a watercourse:
a. Notify adjacent communities and the California department of water resources prior to alteration or relocation;
b. Submit evidence of such notification to the FEMA; and
c. Assure that the flood carrying capacity within the altered or relocated portion of said watercourse is maintained.

2. Base Flood Elevation Changes Due To Physical Alterations:
a. Within six (6) months of information becoming available or project completion, whichever comes first, the floodplain administrator shall submit or assure that the permit applicant submits technical or scientific data to FEMA for a Letter of Map Revision (LOMR).
b. All LOMR's for flood control projects are approved prior to the issuance of building permits. Building permits must not be issued based on Conditional Letters of Map Revision (CLOMR's). Approved CLOMR's allow construction of the proposed flood control project and land preparation as specified in the "start of construction" definition. Such submissions are necessary so that upon confirmation of those physical changes affecting flooding conditions, risk premium rates and floodplain management requirements are based on current data.

3. Changes In Corporate Boundaries:
a. Notify FEMA in writing whenever the corporate boundaries have been modified by annexation or other means and include a copy of a map of the community clearly delineating the new corporate limits.

D. Documentation Of Floodplain Development: Obtain and maintain for public inspection and make available as needed the following:

1. Certification required by sections 15.32.110 and 15.32.140 of this chapter (lowest floor elevations);

2. Certification required by subsection 15.32.110C4 of this chapter (elevation or floodproofing of nonresidential structures);

3. Certification of elevation required by subsection 15.32.110C5 of this chapter (wet floodproofing standards);

4. Certification of elevation required by section 15.32.130, "Subdivision Standards", of this chapter;

5. Certification required by section 15.32.160 of this chapter (floodway encroachments);

6. Reports required by section 15.32.170 of this chapter (mudflow standards).

E. Map Determinations: Make interpretations, where needed, as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions). Any person contesting the location of a boundary shall be given a reasonable opportunity to appeal the interpretation as provided in sections 15.32.180 and 15.32.190 of this chapter.

F. Remedial Action: Take action to remedy violations of this chapter."

SECTION 5. Section 15.32.110 of Chapter 15.32 of the Redlands Municipal Code, entitled "Construction Standards," is hereby amended to read as follows:

"15.32.110: CONSTRUCTION STANDARDS:

In all areas of special flood hazards the following standards are required:

A. Anchoring:
1. All new construction and substantial improvements shall be anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy.
2. All manufactured homes shall meet the anchoring standards of section 15.32.140 of this chapter.

B. Construction Materials And Methods:
1. All new construction and substantial improvements shall be constructed with flood resistant materials and utility equipment resistant to flood damage;
2. All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage;
3. All new construction and substantial improvements shall be constructed with electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding by elevating said equipment by at least one foot (1') above the base flood elevation; and

4. If within zone AH or AO, adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures.

C. Elevation And Floodproofing:

1. Residential construction, new or substantial improvement of any structure in zone AE, AH, or A1-30 shall have the lowest floor, including basement, elevated two feet (2') above the base flood elevation. Upon the completion of the structure the elevation of the lowest floor including basement shall be certified by a registered professional engineer or surveyor, or verified by the chief building official to be properly elevated.

2. Residential construction, new or substantial improvement, of any structure in zone AO shall have the lowest floor, including basement, elevated above the highest adjacent grade to a height exceeding the depth number specified in feet on the FIRM by at least two feet (2'), or elevated at least four feet (4') above the highest adjacent grade if no depth number is specified. Upon the completion of the structure, the elevation of the lowest floor including basement shall be certified by a registered professional engineer or surveyor, or by the chief building official to be properly elevated.

3. Residential construction, new or substantial improvement of any structure in zone A shall have the lowest floor, including basement, be elevated at least two feet (2') above the base flood elevation. Upon the completion of the structure, the elevation of the lowest floor including basement shall be certified by a registered professional engineer or surveyor, or by the chief building official to be properly elevated.

4. Nonresidential construction, new or substantial improvement, in AO zones shall either be elevated in conformance with subsection C1 or C2 of this section or together with attendant utility and sanitary facilities be floodproofed to at least two feet (2') above the BFE so that below this level the structure is watertight with walls substantially impermeable to the passage of water, have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy, and be certified by a registered professional engineer or architect that the standards of this subsection are satisfied. Such certifications shall be provided to the chief building official.

5. All new construction and substantial improvements, that fully enclose areas below the lowest floor (excluding basements) that are usable solely for parking of vehicles, building access or storage, and which are subject to flooding, shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement shall either be certified by a registered professional engineer or architect and must meet or exceed the following minimum criteria:

a. Have a minimum of two (2) openings having a total net area of not less than one square inch for every square foot of enclosed area subject to

flooding. The bottom of all openings shall be no higher than one foot (1') above grade. Openings may be equipped with screens, louvers, valves or other coverings or devices; provided, that they permit the automatic entry and exit of floodwaters; or

b. Be certified by a registered professional engineer or architect.

6. Manufactured homes shall satisfy the standards in section 15.32.140 of this chapter."

SECTION 6. Section 15.32.130 of Chapter 15.32 of the Redlands Municipal Code, entitled "Subdivision Standards," is hereby amended to read as follows:

"15.32.130: SUBDIVISION STANDARDS:

A. All preliminary subdivision proposals greater than 50 lots or 5 acres shall identify the special flood hazard area and the elevation of the base flood.

B. All final subdivision plans shall provide the elevation of proposed structures and pads. If the site is filled above the base flood elevation, the lowest floor and pad elevation shall be certified by a registered professional engineer or surveyor and provided to the chief building official.

C. All subdivision proposals shall be consistent with the need to minimize flood damage.

D. All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize flood damage by dry floodproofing and elevating equipment by at least one foot (1') above the base flood elevation.

E. All subdivisions shall provide adequate drainage to reduce exposure to flood hazards."

SECTION 7. Section 15.32.140 of Chapter 15.32 of the Redlands Municipal Code, entitled "Standards for Manufactured Homes," is hereby amended to read as follows:

"15.32.140: STANDARDS FOR MANUFACTURED HOMES:

A. All manufactured homes that are placed or substantially improved within zones A1-30, AH, and AE on the community's flood insurance rate map, on sites located: 1) outside of a manufactured home park or subdivision; 2) in a new manufactured home park or subdivision; 3) in an expansion to an existing manufactured home park or subdivision; 4) in an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood, shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated to at least two feet (2') above the base flood elevation and be securely fastened to an adequately anchored foundation system to resist flotation collapse and lateral movement.

B. All manufactured homes to be placed or substantially improved on sites in an

existing manufactured home park or subdivision within zones A1-30, AH, and AE on the community's flood insurance rate map that are not subject to the provisions of subsection A of this section will be fastened to an adequately anchored foundation system to resist flotation, collapse, and lateral movement, and to be elevated so that either:

1. The lowest floor of the manufactured home is at least two feet (2') above the base flood elevation."

SECTION 8. Immediate threat to public health, safety, and welfare.

Based on the findings herein, this Urgency Ordinance is adopted pursuant to California Government Code section 36937 to address an immediate threat to the public health, safety, and welfare. The City Council has determined that failing to immediately adopt the necessary updates to Chapter 15.32 (Flood Damage Prevention) by October 30, 2025, will result in the loss of eligibility for the National Flood Insurance Program, and such loss of eligibility and insurance presents an immediate threat to the public health, safety, and welfare of persons and properties within the City of Redlands.

SECTION 9. Urgency Ordinance. In accordance with California Government Code sections 36934 and 36937, this ordinance is an Urgency Ordinance and shall take effect and be enforced immediately upon adoption.

SECTION 10. Conflicting Provisions. For the term of this ordinance, the provisions of this ordinance shall govern. To the extent that there is any conflict between the provisions of this ordinance and the provisions of the City's Municipal Code, or any ordinance, resolution, or policy of the City, all such conflicting provisions shall be suspended or modified to the extent necessary to implement the provisions of this Urgency Ordinance.

SECTION 11. Environmental Determination. The City Council has reviewed the matter and, based upon the facts and information contained in the staff report, administrative record, and written and oral testimony, hereby finds that this ordinance is not subject to the California Environmental Quality Act (CEQA) pursuant to Sections 15061(b)(3) and 15378(b)(5) of the State CEQA Guidelines, in that it will not result in a direct or reasonably foreseeable indirect physical change on the environment nor have a significant impact on the environment.

SECTION 12. Severability. If any section, subsection, subdivision, sentence, clause, phrase, or portion of this Urgency Ordinance for any reason is held to be invalid or unconstitutional by the decision of any court of competent jurisdiction, such decision shall not affect the validity of the remaining portions of this Urgency Ordinance. The City Council hereby declares that it would have adopted this Urgency Ordinance, and each section, subsection, subdivision, sentence, clause, phrase, or portion thereof, irrespective of the fact that any one or more sections, subsections, subdivisions, sentences, clauses, phrases, or portions thereof be declared invalid or unconstitutional.

SECTION 13. Publication and Effective Date. This Urgency Ordinance is enacted pursuant to the authority conferred upon the City Council by Government Code Sections 36934 and 36937 and shall be in full force and effect upon its adoption by a four-fifths (4/5) vote of the City Council. The City Clerk shall cause this Urgency Ordinance to be published once in a newspaper of general circulation within fifteen (15) days after its adoption.

_____
Mario Saucedo, Mayor

ATTEST:

_____
Jeanne Donaldson, City Clerk

I, Jeanne Donaldson, City Clerk of the City of Redlands, hereby certify that the foregoing urgency ordinance was duly adopted by the City Council at a regular meeting thereof held on the 21st day of October, 2025.

AYES:
NOES:
ABSENT:
ABSTAINED:

_____
Jeanne Donaldson, City Clerk

ORDINANCE NO. 2992

AN ORDINANCE OF THE CITY OF REDLANDS AMENDING TITLE 15, CHAPTER 15.32, OF THE REDLANDS MUNICIPAL CODE RELATING TO FLOOD DAMAGE PREVENTION AND FLOODPLAIN MANAGEMENT.

WHEREAS, California Government Code sections 65302, 65560, and 65800 conferred upon local governments the authority to adopt regulations designed to promote the public health, safety, and general welfare of its citizenry, and the City of Redlands has previously adopted floodplain management regulations; and

WHEREAS, on September 20, 2016, the City Council of the City of Redlands adopted Ordinance No. 2837 updating Title 15, Chapter 15.32 (Flood Damage Prevention), of the Redlands Municipal Code; and

WHEREAS, the City of Redlands desires to update Title 15, Chapter 15.32 (Flood Damage Prevention), of the Redlands Municipal Code to align with current applicable State and/or Federal guidance and regulations; and

WHEREAS, the National Flood Insurance Act of 1968 was enacted by title XIII of the Housing & Urban Development Act of 1968 ("Act") to provide previously unavailable flood insurance protection to property owners in flood-prone areas. Under the Act and the regulations promulgated under the Act, specifically 44 CFR § 59.2, in order to qualify for the sale of federally-subsidized flood insurance, the City must adopt and submit to the Federal Insurance Administrator an ordinance adopting flood plain management regulations that satisfy the requirements of 44 CFR Part 60 and that are designed to reduce or avoid future flood, mudslide or flood-related erosion damages and include enforcement provisions; and

WHEREAS, while the City of Redlands has adopted the most recent version of the California Building Code and has an ordinance for flood plain management regulations that previously satisfied the prerequisites for the National Flood Insurance Program or the regulations set forth at 44 CFR Part 60, amendments to the City's ordinance are required to continue to satisfy the National Flood Insurance Program or the regulations set forth at 44 CFR Part 60; and

WHEREAS, pursuant to 44 CFR § 59.24, a government entity that is otherwise eligible for the sale of federal flood insurance shall be subject to suspension from the National Flood Insurance Program for failing to submit copies of adequate flood plain management regulations meeting the minimum requirements of 4 CFR Part 60 and,

WHEREAS, the City Council finds that the impending loss of community eligibility for discounted flood insurance under the National Flood Insurance Program poses a current and immediate threat to the public health, safety, and welfare presented by floods and related conditions during the upcoming rainy season(s). In the absence of this ordinance's effectiveness, the City would be unable to secure eligibility to purchase discounted federal flood insurance for affected community members, as well as to protect the public health, safety, and welfare from

the potential adverse effects of lack of insurance coverage to recover from a flood or flood-related disaster; and

WHEREAS, on October 21, 2025, the City Council held a regular public meeting at which interested persons had an opportunity to testify in support of, or opposition to, Ordinance No. 2992; and

WHEREAS, after closing public comment and deliberating upon the matter, the City Council finds that approval of the proposed amendment to Title 15, Chapter 15.32 (Flood Damage Prevention), of the Redlands Municipal Code will be in the best interests of the public health, safety, and general welfare.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF REDLANDS DOES ORDAIN AS FOLLOWS:

SECTION 1. Section 15.32.020 of Chapter 15.32 of the Redlands Municipal Code, entitled "Definitions," is hereby amended to read as follows:

"15.32.020: DEFINITIONS:

The following words shall have the meanings ascribed to them:

ACCESSORY STRUCTURE: A structure that is accessory to and incidental to that of the dwelling(s) and that is located on the same structure.

ACCESSORY USE: A use which is incidental and subordinate to the principal use of the parcel of land on which it is located.

ALLUVIAL FAN: A geomorphologic feature characterized by a cone or fan shaped deposit of boulders, gravel, and fine sediments that have been eroded from mountain slopes, transported by flood flows, and then deposited on the valley floors, and which is subject to flash flooding, high velocity flows, debris flows, erosion, sediment movement and deposition, and channel migration.

APEX: The point of highest elevation on an alluvial fan, which on undisturbed fans is generally the point where the major stream that formed the fan emerges from the mountain front.

APPEAL: A request for a review of the chief building official's interpretation of any provision of this chapter.

AREA OF SHALLOW FLOODING: A designated AO or AH zone on the flood insurance rate map (FIRM) where the base flood depths range from one to three feet (3'), a clearly defined channel does not exist, the path of flooding is unpredictable and indeterminate, and velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

ATTENDANT UTILITIES AND EQUIPMENT: Utilities, mechanical. Electrical, fuel gas, plumbing, HVAC, and related equipment, as well as services associated with new construction and substantial improvements.

BASE FLOOD: A flood which has a one percent (1%) chance of being equaled or exceeded in any given year (also called the "100-year flood"). Base flood is the term used throughout this chapter.

BASE FLOOD ELEVATION (BFE): Elevation of flooding, including wave height, have a one percent (1%) chance of being equaled or exceeded in any given year.

BASEMENT: Any area of the building having its floor subgrade (below ground level) on all sides.

DEVELOPMENT: Any manmade change to improved or unimproved real estate, including, but not limited to, buildings, structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.

DRY FLOODPROOFING: A combination of measures that results in a structure, including the attendant utilities and equipment, being watertight with all elements substantially impermeable and with structural components having the capacity to resist flood loads.

ENCROACHMENT: The advance or infringement of uses, plant growth, fill, excavation, buildings, permanent structures or development into a floodplain which may impede or alter the flow capacity of a floodplain.

EXISTING MANUFACTURED HOME PARK OR SUBDIVISION: A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the floodplain management regulations adopted by a community.

EXPANSION TO AN EXISTING MANUFACTURED HOME PARK OR SUBDIVISION: The preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads).

FLOOD BOUNDARY AND FLOODWAY MAP (FBFM): The official map on which the federal emergency management agency or federal insurance administration has delineated both the areas of special flood hazard and the floodway.

FLOOD, FLOODING, OR FLOODWATER:

A. A general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland or tidal waters, the unusual and rapid accumulation or runoff of surface waters from any source, and/or mudslides (i.e., mudflows); and

B. The condition resulting from flood related erosion.

FLOOD HAZARD BOUNDARY MAP: The official map on which the federal emergency management agency or federal insurance administration has delineated the areas of flood hazards.

FLOOD INSURANCE RATE MAP (FIRM): The official map on which the federal emergency management agency or federal insurance administration has delineated both the areas of special flood hazards and the risk of premium zones applicable to the community.

FLOOD INSURANCE STUDY: The official report provided by the federal insurance administration that includes flood profiles, the flood insurance rate map, the flood boundary and floodway map and the water surface elevation of the base flood.

FLOODPLAIN ADMINISTRATOR: The city's chief building official.

FLOODPLAIN MANAGEMENT: The operation of an overall program of corrective and preventive measures for reducing flood damage and preserving and enhancing, where possible, natural resources in the floodplain, including, but not limited to, emergency preparedness plans, flood control works, floodplain management regulations and open space plans.

FLOODPLAIN MANAGEMENT REGULATIONS: This chapter, subdivision regulations, building codes, health regulations, ordinances (such as grading and erosion control) and other applications of police power regulations which control development in flood prone areas. This term describes federal, state or local regulations, in any combination thereof, which provide standards for preventing and reducing flood loss and damage.

FLOODPLAIN OR FLOOD PRONE AREA: Any land area susceptible to being inundated by water from any source (see definition of Flood, Flooding, Or Floodwater).

FLOODPROOFING: Any combination of structural and nonstructural additions, changes or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

FLOODWAY: The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot (1') ~~(referred to as "regulatory floodway")~~.

FLOODWAY FRINGE: That area of the floodplain on either side of the "regulatory floodway" where encroachment may be permitted.

FRAUD AND VICTIMIZATION: As related to sections 15.32.180 and 15.32.190 of this chapter, means that the variance granted must not cause fraud on or victimization of the public. In examining this requirement, the city will consider the fact that every newly constructed building adds to government responsibilities and remains a part of the city for fifty (50) to one hundred (100) years. Buildings that are permitted to be constructed below the base flood elevation are subject during all those years to increased risk of damage from floods, while future owners of the property and the city as a whole are subject to all the costs, inconvenience, danger, and suffering that those increased flood damages bring. In addition, future owners may purchase the property, unaware that it is subject to potential flood damage, and can be insured only at very high flood insurance rates.

FUNCTIONALLY DEPENDENT USE: A use which cannot perform its intended purpose unless it is located or carried out in close proximity to water.

GOVERNING BODY: The city council of the city of Redlands that is empowered to adopt and implement regulations to provide for the public health, safety and general welfare of its citizenry.

HARDSHIP: As related to section 15.32.190 of this chapter, means the exceptional hardship that would result from a failure to grant a requested variance. The city council requires that the variance be exceptional, unusual, and peculiar to the property involved. Mere economic or financial hardship alone is not exceptional. Inconvenience, aesthetic considerations, physical handicaps, personal preferences, or the disapproval of one's neighbors likewise cannot, as a rule, qualify as an exceptional hardship. All of these problems can be resolved through other means

without granting a variance, even if the alternative is more expensive, or requires the property owner to build elsewhere or put the parcel to a different use than originally intended.

HIGHEST ADJACENT GRADE: The highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

HISTORIC STRUCTURE: Any structure that is:

A. Listed individually in the national register of historic places (a listing maintained by the department of interior) or preliminarily determined by the secretary of the interior as meeting the requirements for individual listing on the national register;

B. Certified or preliminarily determined by the secretary of the interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the secretary to qualify as a registered historic district;

C. Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the secretary of the interior; or

D. Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either by an approved state program as determined by the secretary of the interior or directly by the secretary of the interior in states without approved programs.

LEVEE: A manmade structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control or divert the flow of water so as to provide protection from temporary flooding.

LEVEE SYSTEM: A flood protection system which consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accord with sound engineering practices.

LOWEST FLOOR: The lowest floor of the lowest enclosed area, including basement (see definition of Basement), for:

A. An unfinished or flood resistant enclosure below the lowest floor that is usable solely for parking of vehicles, building access or storage in an area other than a basement area, is not considered a building's lowest floor provided it conforms to applicable nonelevation design requirements, but not limited to:

1. The wet floodproofing standard in subsection 15.32.110C of this chapter;

2. The anchoring standards in subsection 15.32.110A of this chapter;

3. The construction materials and methods standards in subsection 15.32.110B of this chapter; and

4. The standards for utilities in section 15.32.120 of this chapter.

B. Residential structures, all subgrade enclosed areas are prohibited as they are considered to be basements (see definition of Basement). This prohibition includes below grade garages and storage areas.

MANUFACTURED HOME: A structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a "recreational vehicle".

MANUFACTURED HOME PARK OR SUBDIVISION: A parcel (or contiguous parcels) of land divided into two (2) or more manufactured home lots for rent or sale.

MARKET VALUE: The cost to replace the structure in new condition and adjusting that cost figure by the amount of depreciation which has accrued since the structure was constructed. The cost of replacement of the structure shall be based on a square foot cost factor determined by reference to a building cost estimation guide recognized by the building construction industry. The amount of depreciation shall be determined by taking into account the age and physical deterioration of the structure and functional obsolescence as approved by the floodplain administrator, but shall not include economic or other forms of external obsolescence. Use of replacement costs or accrued depreciation factors different from those contained in recognized building cost estimation guides may be considered only if such factors are included in a report prepared by an independent professional appraiser and supported by written explanation of the differences.

MEAN SEA LEVEL: For purposes of the national flood insurance program, the national geodetic vertical datum (NGVD) of 1929 or other datum, to which base flood elevation shown on a community's flood insurance rate map are referenced.

MINIMUM NECESSARY: To afford relief with a minimum of deviation from the requirements of this chapter.

MUDSLIDE (MUDFLOW) PRONE AREA: An area with land surfaces and slopes of unconsolidated material where the history, geology, and climate indicate a potential for mudflow.

NEW CONSTRUCTION: For floodplain management purposes, means structures for which the "start of construction" commenced on or after the effective date of floodplain management regulations adopted by this community, and includes any subsequent improvements to such structures.

NEW MANUFACTURED HOME PARK OR SUBDIVISION: A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of floodplain management regulations adopted by this city.

OBSTRUCTION: Any dam, wall, wharf, embankment, levee, dike, pile, abutment, protection, excavation, channelization, bridge, conduit, culvert, building, wire, fence, rock, gravel, refuse, fill structure, vegetation or other material in, along, across or projection into any watercourse which may alter, impede, retard or change the direction and/or velocity of the flow of water, or due to its location, its propensity to snare or collect debris carried by the flow of water, or its likelihood of being carried downstream.

PUBLIC SAFETY AND NUISANCE: As related to section 15.32.190 of this chapter, means that the granting of a variance must not result in anything which is injurious to safety or health of an entire community or neighborhood, or any considerable number of persons, or unlawfully obstructs the free passage or use, in the customary manner, of any navigable lake or river, bay, stream, canal, or basin.

RECREATIONAL VEHICLE: A vehicle which is:

A. Built on a single chassis;

B. Four hundred (400) square feet or less when measured at the largest horizontal projection;

C. Designed to be self-propelled or permanently towable by a light duty truck; and

D. Designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

REGULATORY FLOODWAY: ~~The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot (1').~~ Channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

REMEDY A VIOLATION: To bring a structure or other development into compliance with state and local floodplain management regulations, or, if that is not possible, to reduce the impacts of its noncompliance. Ways that impacts may be reduced include protecting the structure or other affected development from flood damages, implementing the enforcement provisions of this chapter or otherwise deterring future similar violations, or reducing state or federal financial exposure with regard to the structure or other development.

RIVERINE: Relating to, formed by, or resembling a river (including tributaries), stream or brook.

SPECIAL FLOOD HAZARD AREA (SFHA): An area in the floodplain subject to a one percent (1%) or greater chance of flooding in any given year and is shown on an FHBM or FIRM as zone A, AO, A1-30, AE, A99, or AH.

START OF CONSTRUCTION: Includes substantial improvement, and other proposed new development and means the date the building permit was issued; provided, the actual start of construction, repair, reconstruction, rehabilitation, addition, placement or other improvement was within one hundred eighty (180) days of the permit date. The "actual start" means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of manufactured home on a foundation. "Permanent construction" does not include land preparation, such as clearing, grading and filling, the installation of streets and/or walkways; nor does it include the excavation of basements, footings, piers or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first

alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

STRUCTURE: A walled and roofed building that is principally above ground; including a gas or liquid storage tank or a manufactured home.

SUBSTANTIAL DAMAGE: Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed fifty percent (50%) of the market value of the structure before the damage occurred.

SUBSTANTIAL IMPROVEMENT: Any reconstruction, rehabilitation, addition, or other proposed new development of a structure, the cost of which equals or exceeds fifty percent (50%) of the market value of the structure before the start of construction of the improvement. This term includes structures which have incurred substantial damage, regardless of the actual repair work performed. The term does not, however, include either:

A. Any project for improvement of a structure to correct existing violations or state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions; or

B. Any alteration of a historic structure, provided that the alteration will not preclude the structure's continued designation as a historic structure.

VARIANCE: A grant of relief from the requirements of this chapter which permits construction in a manner that would otherwise be prohibited by this chapter.

VIOLATION: The failure of a structure or other development to be fully compliant with this chapter. A structure or other development without the elevation certificate, other certification, or other evidence of compliance required by this chapter is presumed to be in violation until such time as that documentation is provided.

WATER SURFACE ELEVATION: The height, in relation to the national geodetic vertical datum (NGVD) of 1929 (or the datum, where specified), of floods of various magnitudes and frequencies in the floodplains of coastal or riverine areas.

WATERCOURSE: A lake, river, creek, stream, wash, arroyo, channel or other topographic feature on or over which waters flow at least periodically. Watercourse includes specifically designated areas in which substantial flood damage may occur."

SECTION 2. Section 15.32.040 of Chapter 15.32 of the Redlands Municipal Code, entitled "Establishing the Areas of Special Flood Hazard," is hereby amended to read as follows:

"15.32.040: ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD:

The areas of special flood hazard identified by the federal insurance administration (FIA) of the federal emergency management agency (FEMA) in the ~~flood insurance study (FIS) dated July 3, 1978, and the flood insurance rate map (FIRMs) and flood boundary and floodway maps (FBFMs), dated January 3, 1979,~~ "Flood Insurance Study (FIS) for San Bernardino County, California and Incorporated Areas" dated January 17, 1997, with accompanying flood insurance

rate maps (FIRMs) and flood boundary and floodway maps (FBFMs), dated January 3, 1979, and all subsequent amendments and/or revisions, are adopted by reference and declared to be a part of this chapter. This flood insurance study (FIS) and attendant mapping is the minimum area of applicability of this chapter and may be supplemented by studies for other areas which allow implementation of this chapter and which are recommended to the city council by the chief building official. The study, FIRMs and FBFMs are on file at 35 Cajon Street, Suite 20, department of building and safety."

SECTION 3. Section 15.32.080 of Chapter 15.32 of the Redlands Municipal Code, entitled "Warning and Disclaimer of Liability," is hereby amended to read as follows:

"15.32.080: WARNING AND DISCLAIMER OF LIABILITY:

The degree of flood protection required by this chapter is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on occasions and flood heights may be increased by manmade or natural causes. This chapter does not imply that land outside the areas of special flood hazards, or uses permitted within such areas will be free from flooding or flood damages. This chapter shall not create liability on the part of the city, any elected official, officer or employee thereof, the state of California, or the federal insurance administration, federal emergency management agency, for any flood damages that result from reliance on this chapter or any rule or regulation made pursuant to this chapter.

If any section, provision or portion of the ordinance is deemed unconstitutional or invalid by a court, the remainder of the ordinance shall be effective."

SECTION 4. Section 15.32.100 of Chapter 15.32 of the Redlands Municipal Code, entitled "Chief Building Official; Duties and Responsibilities," is hereby amended to read as follows:

"15.32.100: CHIEF BUILDING OFFICIAL; DUTIES AND RESPONSIBILITIES:

The chief building official, as the designated floodplain administrator, shall administer, implement, and enforce this chapter by granting or denying development permits in accordance with its provisions and the chief building official duties and responsibilities shall include, but not be limited to:

A. Permit Review:

1. Review all development permits to determine that the permit requirements of this chapter have been satisfied;

2. Ensure that all other state and federal permits have been obtained;

3. Determine that the site is reasonably safe from flooding; and

4. ~~The proposed development does not adversely affect the carrying capacity of areas where base flood elevations have been determined but a floodway has not been designated. For purposes of this chapter, "adversely affects" means that the cumulative effect of the proposed development when combined with all other existing and anticipated development will increase the water surface elevation of~~

~~the base flood more than one foot (1') at any point.~~
The proposed development within zones A1-30 and AE without a designated floodway does not adversely affect the carrying capacity of areas where base flood elevations have been determined but a floodway has not been designated. For purposes of this chapter, "adversely affects" means that the cumulative effect of the proposed development when combined with all other existing and anticipated development will increase the water surface elevation of the base flood more than one foot (1') at any point.

B. Review, Use And Development Of Other Base Flood Data:

1. When base flood elevation data has not been provided in accordance with section 15.32.040 of this chapter, the chief building official shall obtain, review and utilize any base flood elevation and floodway data available from a federal, state or other sources, or if no base flood elevation data is available from a federal or state agency or other source, in order to administer section 15.32.110 of this chapter. Any such information shall be submitted to the city for adoption; or

2. If no base flood elevation data is available from a federal or state agency or other source, then a base flood elevation shall be obtained using one of the two (2) methods from the FEMA publication "Managing Floodplain Development In Approximate Zone A Areas-A Guide Of Obtaining And Developing Base (100-Year) Flood Elevations" dated July 1995, in order to administer section 15.32.110 of this chapter.

a. Simplified method:

(1) 100-year or base flood discharge shall be obtained using the appropriate regression equation found in a U.S. geological survey publication, or the discharge-drainage area method; and

(2) Base flood elevation shall be obtained using the Quick-2 computer program developed by FEMA; or

b. Detail method:

(1) 100-year or base flood discharge shall be obtained using the U.S. army corps of engineers' HEC-HMS computer program; and

(2) Base flood elevation shall be obtained using the U.S. army corps of engineers' HEC-RAS computer program.

C. Notification Of Other Agencies:

1. In alteration or relocation of a watercourse:

a. Notify adjacent communities and the California department of water resources prior to alteration or relocation;

b. Submit evidence of such notification to the FEMA; and

c. Assure that the flood carrying capacity within the altered or relocated portion of said watercourse is maintained.

2. Base Flood Elevation Changes Due To Physical Alterations:

a. Within six (6) months of information becoming available or project completion, whichever comes first, the floodplain administrator shall submit or assure that the permit applicant submits technical or scientific data to FEMA for a Letter of Map Revision (LOMR).

b. All LOMR's for flood control projects are approved prior to the issuance of building permits. Building permits must not be issued based on Conditional Letters of Map Revision (CLOMR's). Approved CLOMR's allow construction of the proposed flood control project and land preparation as specified in the "start of construction" definition.

Such submissions are necessary so that upon confirmation of those physical changes affecting flooding conditions, risk premium rates and floodplain management requirements are based on current data.

3. Changes In Corporate Boundaries:

a. Notify FEMA in writing whenever the corporate boundaries have been modified by annexation or other means and include a copy of a map of the community clearly delineating the new corporate limits.

D. Documentation Of Floodplain Development: Obtain and maintain for public inspection and make available as needed the following:

1. Certification required by sections 15.32.110 and 15.32.140 of this chapter (lowest floor elevations);

2. Certification required by subsection 15.32.110C4 of this chapter (elevation or floodproofing of nonresidential structures);

3. Certification of elevation required by subsection 15.32.110C5 of this chapter (wet floodproofing standards);

4. Certification of elevation required by section 15.32.130, "Subdivision Standards", of this chapter;

5. Certification required by section 15.32.160 of this chapter (floodway encroachments);

6. Reports required by section 15.32.170 of this chapter (mudflow standards).

E. Map Determinations: Make interpretations, where needed, as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions). Any person contesting the location of a boundary shall be given a reasonable opportunity to appeal the interpretation as provided in sections 15.32.180 and 15.32.190 of this chapter.

F. Remedial Action: Take action to remedy violations of this chapter."

SECTION 5. Section 15.32.110 of Chapter 15.32 of the Redlands Municipal Code, entitled "Construction Standards," is hereby amended to read as follows:

"15.32.110: CONSTRUCTION STANDARDS:

In all areas of special flood hazards the following standards are required:

A. Anchoring:

1. All new construction and substantial improvements shall be anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy.

2. All manufactured homes shall meet the anchoring standards of section 15.32.140 of this chapter.

B. Construction Materials And Methods:

1. All new construction and substantial improvements shall be constructed with flood resistant materials and utility equipment resistant to flood damage;

2. All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage;

3. All new construction and substantial improvements shall be constructed with electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding~~;~~ ~~and~~ by elevating said equipment by at least one foot (1') above the base flood elevation; and

4. If within zone AH or AO, adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures.

C. Elevation And Floodproofing:

1. Residential construction, new or substantial improvement of any structure in zone AE, AH, or A1-30 shall have the lowest floor, including basement, elevated two feet (2') above the base flood elevation. Upon the completion of the structure the elevation of the lowest floor including basement shall be certified by a registered professional engineer or surveyor, or verified by the chief building official to be properly elevated.

2. Residential construction, new or substantial improvement, of any structure in zone AO shall have the lowest floor, including basement, elevated above the highest adjacent grade to a height exceeding the depth number specified in feet on the FIRM by at least two feet (2'), or elevated at least four feet (4') above the highest adjacent grade if no depth number is specified. Upon the completion of the structure, the elevation of the lowest floor including basement shall be

certified by a registered professional engineer or surveyor, or by the chief building official to be properly elevated.

3. Residential construction, new or substantial improvement of any structure in zone A shall have the lowest floor, including basement, be elevated at least two feet (2') above the base flood elevation. Upon the completion of the structure, the elevation of the lowest floor including basement shall be certified by a registered professional engineer or surveyor, or by the chief building official to be properly elevated.

4. ~~Nonresidential construction, new or substantial improvement, shall either be elevated in conformance with subsection C1 or C2 of this section or together with attendant utility and sanitary facilities be floodproofed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water, have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy, and be certified by a registered professional engineer or architect that the standards of this subsection are satisfied. Such certifications shall be provided to the chief building official.~~ Nonresidential construction, new or substantial improvement, in AO zones shall either be elevated in conformance with subsection C1 or C2 of this section or together with attendant utility and sanitary facilities be floodproofed to at least two feet (2') above the BFE so that below this level the structure is watertight with walls substantially impermeable to the passage of water, have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy, and be certified by a registered professional engineer or architect that the standards of this subsection are satisfied. Such certifications shall be provided to the chief building official.

5. All new construction and substantial improvements, that fully enclose areas below the lowest floor (excluding basements) that are usable solely for parking of vehicles, building access or storage, and which are subject to flooding, shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement shall either be certified by a registered professional engineer or architect and must meet or exceed the following minimum criteria:

a. Have a minimum of two (2) openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding. The bottom of all openings shall be no higher than one foot (1') above grade. Openings may be equipped with screens, louvers, valves or other coverings or devices; provided, that they permit the automatic entry and exit of floodwaters; or

b. Be certified by a registered professional engineer or architect.

6. Manufactured homes shall satisfy the standards in section 15.32.140 of this chapter."

SECTION 6. Section 15.32.130 of Chapter 15.32 of the Redlands Municipal Code, entitled "Subdivision Standards," is hereby amended to read as follows:

"15.32.130: SUBDIVISION STANDARDS:

A. All preliminary subdivision proposals greater than 50 lots or 5 acres shall identify the special flood hazard area and the elevation of the base flood.

B. All final subdivision plans shall provide the elevation of proposed structures and pads. If the site is filled above the base flood elevation, the lowest floor and pad elevation shall be certified by a registered professional engineer or surveyor and provided to the chief building official.

C. All subdivision proposals shall be consistent with the need to minimize flood damage.

D. All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize flood damage by dry floodproofing and elevating equipment by at least one foot (1') above the base flood elevation.

E. All subdivisions shall provide adequate drainage to reduce exposure to flood hazards."

SECTION 7. Section 15.32.140 of Chapter 15.32 of the Redlands Municipal Code, entitled "Standards for Manufactured Homes," is hereby amended to read as follows:

"15.32.140: STANDARDS FOR MANUFACTURED HOMES:

A. All manufactured homes that are placed or substantially improved within zones A1-30, AH, and AE on the community's flood insurance rate map, on sites located: 1) outside of a manufactured home park or subdivision; 2) in a new manufactured home park or subdivision; 3) in an expansion to an existing manufactured home park or subdivision; 4) in an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood, shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated to at least two feet (2') above the base flood elevation and be securely fastened to an adequately anchored foundation system to resist flotation collapse and lateral movement.

B. All manufactured homes to be placed or substantially improved on sites in an existing manufactured home park or subdivision within zones A1-30, AH, and AE on the community's flood insurance rate map that are not subject to the provisions of subsection A of this section will be fastened to an adequately anchored foundation system to resist flotation, collapse, and lateral movement, and to be elevated so that either:

1. The lowest floor of the manufactured home is at least two feet (2') above the base flood elevation~~; or~~.

~~2. The manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than thirty six inches (36") in height above grade. Upon completion of the structure, the elevation of the lowest floor including basement shall be certified by a registered~~

~~professional engineer or surveyor, and verified by the city building inspector to be properly elevated. Such certification and verification shall be provided to the chief building official.~~"

SECTION 8. Section 15.32.160 of Chapter 15.32 of the Redlands Municipal Code, entitled "Floodways," is hereby amended to read as follows:

"15.32.160: FLOODWAYS:

Located within areas of special flood hazard established in section 15.32.040 of this chapter are areas designated as regulatory floodways. Because the regulatory floodway is an extremely hazardous area due to the velocity of floodwaters which carry debris, potential projectiles and erosion potential, the following provisions shall apply:

A. Prohibit encroachments, including fill, new construction, substantial improvements, and other development unless certification by a registered professional engineer or architect is provided demonstrating that encroachments shall not result in any increase in the base flood levels during the occurrence of the base flood discharge.

B. If the above is satisfied, all new construction, substantial improvements, and proposed development shall comply with all other applicable flood hazard reduction provisions of this chapter."

SECTION 9. Environmental Determination. The City Council has reviewed the matter and, based upon the facts and information contained in the staff report, administrative record, and written and oral testimony, hereby finds that this ordinance is not subject to the California Environmental Quality Act (CEQA) pursuant to Sections 15061(b)(3) and 15378(b)(5) of the State CEQA Guidelines, in that it will not result in a direct or reasonably foreseeable indirect physical change on the environment nor have a significant impact on the environment.

SECTION 10. Severability. If any section, subsection, subdivision, sentence, clause, phrase, or portion of this Ordinance for any reason is held to be invalid or unconstitutional by the decision of any court of competent jurisdiction, such decision shall not affect the validity of the remaining portions of this Ordinance. The City Council hereby declares that it would have adopted this Ordinance, and each section, subsection, subdivision, sentence, clause, phrase, or portion thereof, irrespective of the fact that any one or more sections, subsections, subdivisions, sentences, clauses, phrases, or portions thereof be declared invalid or unconstitutional.

SECTION 11. The Mayor shall sign this ordinance and the City Clerk shall certify to the adoption of this ordinance and shall cause it, or a summary of it, to be published once in a newspaper of general circulation within the City, and thereafter, this ordinance shall take effect as provided by law.

_____

Mario Saucedo, Mayor

ATTEST:

_____

Jeanne Donaldson, City Clerk

I, Jeanne Donaldson, City Clerk, City of Redlands, hereby certify that the foregoing Ordinance was duly adopted by the City Council at the regular meeting thereof, held on the _____ day of _____, 2025, by the following vote:

AYES:
NOES:
ABSENT:
ABSTAIN:

_____

Jeanne Donaldson, City Clerk

ORDINANCE NO. 2992

AN ORDINANCE OF THE CITY OF REDLANDS AMENDING TITLE 15, CHAPTER 15.32, OF THE REDLANDS MUNICIPAL CODE RELATING TO FLOOD DAMAGE PREVENTION AND FLOODPLAIN MANAGEMENT.

WHEREAS, California Government Code sections 65302, 65560, and 65800 conferred upon local governments the authority to adopt regulations designed to promote the public health, safety, and general welfare of its citizenry, and the City of Redlands has previously adopted floodplain management regulations; and

WHEREAS, on September 20, 2016, the City Council of the City of Redlands adopted Ordinance No. 2837 updating Title 15, Chapter 15.32 (Flood Damage Prevention), of the Redlands Municipal Code; and

WHEREAS, the City of Redlands desires to update Title 15, Chapter 15.32 (Flood Damage Prevention), of the Redlands Municipal Code to align with current applicable State and/or Federal guidance and regulations; and

WHEREAS, the National Flood Insurance Act of 1968 was enacted by title XIII of the Housing & Urban Development Act of 1968 ("Act") to provide previously unavailable flood insurance protection to property owners in flood-prone areas. Under the Act and the regulations promulgated under the Act, specifically 44 CFR § 59.2, in order to qualify for the sale of federally-subsidized flood insurance, the City must adopt and submit to the Federal Insurance Administrator an ordinance adopting flood plain management regulations that satisfy the requirements of 44 CFR Part 60 and that are designed to reduce or avoid future flood, mudslide or flood-related erosion damages and include enforcement provisions; and

WHEREAS, while the City of Redlands has adopted the most recent version of the California Building Code and has an ordinance for flood plain management regulations that previously satisfied the prerequisites for the National Flood Insurance Program or the regulations set forth at 44 CFR Part 60, amendments to the City's ordinance are required to continue to satisfy the National Flood Insurance Program or the regulations set forth at 44 CFR Part 60; and

WHEREAS, pursuant to 44 CFR § 59.24, a government entity that is otherwise eligible for the sale of federal flood insurance shall be subject to suspension from the National Flood Insurance Program for failing to submit copies of adequate flood plain management regulations meeting the minimum requirements of 4 CFR Part 60 and,

WHEREAS, the City Council finds that the impending loss of community eligibility for discounted flood insurance under the National Flood Insurance Program poses a current and immediate threat to the public health, safety, and welfare presented by floods and related conditions during the upcoming rainy season(s). In the absence of this ordinance's effectiveness, the City would be unable to secure eligibility to purchase discounted federal flood insurance for affected community members, as well as to protect the public health, safety, and welfare from

the potential adverse effects of lack of insurance coverage to recover from a flood or flood-related disaster; and

WHEREAS, on October 21, 2025, the City Council held a regular public meeting at which interested persons had an opportunity to testify in support of, or opposition to, Ordinance No. 2992; and

WHEREAS, after closing public comment and deliberating upon the matter, the City Council finds that approval of the proposed amendment to Title 15, Chapter 15.32 (Flood Damage Prevention), of the Redlands Municipal Code will be in the best interests of the public health, safety, and general welfare.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF REDLANDS DOES ORDAIN AS FOLLOWS:

SECTION 1. Section 15.32.020 of Chapter 15.32 of the Redlands Municipal Code, entitled "Definitions," is hereby amended to read as follows:

"15.32.020: DEFINITIONS:

The following words shall have the meanings ascribed to them:

ACCESSORY STRUCTURE: A structure that is accessory to and incidental to that of the dwelling(s) and that is located on the same structure.

ACCESSORY USE: A use which is incidental and subordinate to the principal use of the parcel of land on which it is located.

ALLUVIAL FAN: A geomorphologic feature characterized by a cone or fan shaped deposit of boulders, gravel, and fine sediments that have been eroded from mountain slopes, transported by flood flows, and then deposited on the valley floors, and which is subject to flash flooding, high velocity flows, debris flows, erosion, sediment movement and deposition, and channel migration.

APEX: The point of highest elevation on an alluvial fan, which on undisturbed fans is generally the point where the major stream that formed the fan emerges from the mountain front.

APPEAL: A request for a review of the chief building official's interpretation of any provision of this chapter.

AREA OF SHALLOW FLOODING: A designated AO or AH zone on the flood insurance rate map (FIRM) where the base flood depths range from one to three feet (3'), a clearly defined channel does not exist, the path of flooding is unpredictable and indeterminate, and velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

ATTENDANT UTILITIES AND EQUIPMENT: Utilities, mechanical. Electrical, fuel gas, plumbing, HVAC, and related equipment, as well as services associated with new construction and substantial improvements.

BASE FLOOD: A flood which has a one percent (1%) chance of being equaled or exceeded in any given year (also called the "100-year flood"). Base flood is the term used throughout this chapter.

BASE FLOOD ELEVATION (BFE): Elevation of flooding, including wave height, have a one percent (1%) chance of being equaled or exceeded in any given year.

BASEMENT: Any area of the building having its floor subgrade (below ground level) on all sides.

DEVELOPMENT: Any manmade change to improved or unimproved real estate, including, but not limited to, buildings, structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.

DRY FLOODPROOFING: A combination of measures that results in a structure, including the attendant utilities and equipment, being watertight with all elements substantially impermeable and with structural components having the capacity to resist flood loads.

ENCROACHMENT: The advance or infringement of uses, plant growth, fill, excavation, buildings, permanent structures or development into a floodplain which may impede or alter the flow capacity of a floodplain.

EXISTING MANUFACTURED HOME PARK OR SUBDIVISION: A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the floodplain management regulations adopted by a community.

EXPANSION TO AN EXISTING MANUFACTURED HOME PARK OR SUBDIVISION: The preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads).

FLOOD BOUNDARY AND FLOODWAY MAP (FBFM): The official map on which the federal emergency management agency or federal insurance administration has delineated both the areas of special flood hazard and the floodway.

FLOOD, FLOODING, OR FLOODWATER:

A. A general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland or tidal waters, the unusual and rapid accumulation or runoff of surface waters from any source, and/or mudslides (i.e., mudflows); and

B. The condition resulting from flood related erosion.

FLOOD HAZARD BOUNDARY MAP: The official map on which the federal emergency management agency or federal insurance administration has delineated the areas of flood hazards.

FLOOD INSURANCE RATE MAP (FIRM): The official map on which the federal emergency management agency or federal insurance administration has delineated both the areas of special flood hazards and the risk of premium zones applicable to the community.

FLOOD INSURANCE STUDY: The official report provided by the federal insurance administration that includes flood profiles, the flood insurance rate map, the flood boundary and floodway map and the water surface elevation of the base flood.

FLOODPLAIN ADMINISTRATOR: The city's chief building official.

FLOODPLAIN MANAGEMENT: The operation of an overall program of corrective and preventive measures for reducing flood damage and preserving and enhancing, where possible, natural resources in the floodplain, including, but not limited to, emergency preparedness plans, flood control works, floodplain management regulations and open space plans.

FLOODPLAIN MANAGEMENT REGULATIONS: This chapter, subdivision regulations, building codes, health regulations, ordinances (such as grading and erosion control) and other applications of police power regulations which control development in flood prone areas. This term describes federal, state or local regulations, in any combination thereof, which provide standards for preventing and reducing flood loss and damage.

FLOODPLAIN OR FLOOD PRONE AREA: Any land area susceptible to being inundated by water from any source (see definition of Flood, Flooding, Or Floodwater).

FLOODPROOFING: Any combination of structural and nonstructural additions, changes or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

FLOODWAY: The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot (1').

FLOODWAY FRINGE: That area of the floodplain on either side of the "regulatory floodway" where encroachment may be permitted.

FRAUD AND VICTIMIZATION: As related to sections 15.32.180 and 15.32.190 of this chapter, means that the variance granted must not cause fraud on or victimization of the public. In examining this requirement, the city will consider the fact that every newly constructed building adds to government responsibilities and remains a part of the city for fifty (50) to one hundred (100) years. Buildings that are permitted to be constructed below the base flood elevation are subject during all those years to increased risk of damage from floods, while future owners of the property and the city as a whole are subject to all the costs, inconvenience, danger, and suffering that those increased flood damages bring. In addition, future owners may purchase the property, unaware that it is subject to potential flood damage, and can be insured only at very high flood insurance rates.

FUNCTIONALLY DEPENDENT USE: A use which cannot perform its intended purpose unless it is located or carried out in close proximity to water.

GOVERNING BODY: The city council of the city of Redlands that is empowered to adopt and implement regulations to provide for the public health, safety and general welfare of its citizenry.

HARDSHIP: As related to section 15.32.190 of this chapter, means the exceptional hardship that would result from a failure to grant a requested variance. The city council requires that the

variance be exceptional, unusual, and peculiar to the property involved. Mere economic or financial hardship alone is not exceptional. Inconvenience, aesthetic considerations, physical handicaps, personal preferences, or the disapproval of one's neighbors likewise cannot, as a rule, qualify as an exceptional hardship. All of these problems can be resolved through other means without granting a variance, even if the alternative is more expensive, or requires the property owner to build elsewhere or put the parcel to a different use than originally intended.

HIGHEST ADJACENT GRADE: The highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

HISTORIC STRUCTURE: Any structure that is:

A. Listed individually in the national register of historic places (a listing maintained by the department of interior) or preliminarily determined by the secretary of the interior as meeting the requirements for individual listing on the national register;

B. Certified or preliminarily determined by the secretary of the interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the secretary to qualify as a registered historic district;

C. Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the secretary of the interior; or

D. Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either by an approved state program as determined by the secretary of the interior or directly by the secretary of the interior in states without approved programs.

LEVEE: A manmade structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control or divert the flow of water so as to provide protection from temporary flooding.

LEVEE SYSTEM: A flood protection system which consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accord with sound engineering practices.

LOWEST FLOOR: The lowest floor of the lowest enclosed area, including basement (see definition of Basement), for:

A. An unfinished or flood resistant enclosure below the lowest floor that is usable solely for parking of vehicles, building access or storage in an area other than a basement area, is not considered a building's lowest floor provided it conforms to applicable nonelevation design requirements, but not limited to:

1. The wet floodproofing standard in subsection 15.32.110C of this chapter;

2. The anchoring standards in subsection 15.32.110A of this chapter;

3. The construction materials and methods standards in subsection 15.32.110B of this chapter; and

4. The standards for utilities in section 15.32.120 of this chapter.

B. Residential structures, all subgrade enclosed areas are prohibited as they are considered to be basements (see definition of Basement). This prohibition includes below grade garages and storage areas.

MANUFACTURED HOME: A structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a "recreational vehicle".

MANUFACTURED HOME PARK OR SUBDIVISION: A parcel (or contiguous parcels) of land divided into two (2) or more manufactured home lots for rent or sale.

MARKET VALUE: The cost to replace the structure in new condition and adjusting that cost figure by the amount of depreciation which has accrued since the structure was constructed. The cost of replacement of the structure shall be based on a square foot cost factor determined by reference to a building cost estimation guide recognized by the building construction industry. The amount of depreciation shall be determined by taking into account the age and physical deterioration of the structure and functional obsolescence as approved by the floodplain administrator, but shall not include economic or other forms of external obsolescence. Use of replacement costs or accrued depreciation factors different from those contained in recognized building cost estimation guides may be considered only if such factors are included in a report prepared by an independent professional appraiser and supported by written explanation of the differences.

MEAN SEA LEVEL: For purposes of the national flood insurance program, the national geodetic vertical datum (NGVD) of 1929 or other datum, to which base flood elevation shown on a community's flood insurance rate map are referenced.

MINIMUM NECESSARY: To afford relief with a minimum of deviation from the requirements of this chapter.

MUDSLIDE (MUDFLOW) PRONE AREA: An area with land surfaces and slopes of unconsolidated material where the history, geology, and climate indicate a potential for mudflow.

NEW CONSTRUCTION: For floodplain management purposes, means structures for which the "start of construction" commenced on or after the effective date of floodplain management regulations adopted by this community, and includes any subsequent improvements to such structures.

NEW MANUFACTURED HOME PARK OR SUBDIVISION: A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of floodplain management regulations adopted by this city.

OBSTRUCTION: Any dam, wall, wharf, embankment, levee, dike, pile, abutment, protection, excavation, channelization, bridge, conduit, culvert, building, wire, fence, rock, gravel, refuse,

fill structure, vegetation or other material in, along, across or projection into any watercourse which may alter, impede, retard or change the direction and/or velocity of the flow of water, or due to its location, its propensity to snare or collect debris carried by the flow of water, or its likelihood of being carried downstream.

PUBLIC SAFETY AND NUISANCE: As related to section 15.32.190 of this chapter, means that the granting of a variance must not result in anything which is injurious to safety or health of an entire community or neighborhood, or any considerable number of persons, or unlawfully obstructs the free passage or use, in the customary manner, of any navigable lake or river, bay, stream, canal, or basin.

RECREATIONAL VEHICLE: A vehicle which is:

A. Built on a single chassis;

B. Four hundred (400) square feet or less when measured at the largest horizontal projection;

C. Designed to be self-propelled or permanently towable by a light duty truck; and

D. Designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

REGULATORY FLOODWAY: Channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

REMEDY A VIOLATION: To bring a structure or other development into compliance with state and local floodplain management regulations, or, if that is not possible, to reduce the impacts of its noncompliance. Ways that impacts may be reduced include protecting the structure or other affected development from flood damages, implementing the enforcement provisions of this chapter or otherwise deterring future similar violations, or reducing state or federal financial exposure with regard to the structure or other development.

RIVERINE: Relating to, formed by, or resembling a river (including tributaries), stream or brook.

SPECIAL FLOOD HAZARD AREA (SFHA): An area in the floodplain subject to a one percent (1%) or greater chance of flooding in any given year and is shown on an FHBM or FIRM as zone A, AO, A1-30, AE, A99, or AH.

START OF CONSTRUCTION: Includes substantial improvement, and other proposed new development and means the date the building permit was issued; provided, the actual start of construction, repair, reconstruction, rehabilitation, addition, placement or other improvement was within one hundred eighty (180) days of the permit date. The "actual start" means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of manufactured home on a foundation. "Permanent construction" does not include land preparation, such as clearing, grading and filling, the installation of streets and/or walkways; nor does it include the excavation of basements, footings, piers or foundations

or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

STRUCTURE: A walled and roofed building that is principally above ground; including a gas or liquid storage tank or a manufactured home.

SUBSTANTIAL DAMAGE: Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed fifty percent (50%) of the market value of the structure before the damage occurred.

SUBSTANTIAL IMPROVEMENT: Any reconstruction, rehabilitation, addition, or other proposed new development of a structure, the cost of which equals or exceeds fifty percent (50%) of the market value of the structure before the start of construction of the improvement. This term includes structures which have incurred substantial damage, regardless of the actual repair work performed. The term does not, however, include either:

A. Any project for improvement of a structure to correct existing violations or state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions; or

B. Any alteration of a historic structure, provided that the alteration will not preclude the structure's continued designation as a historic structure.

VARIANCE: A grant of relief from the requirements of this chapter which permits construction in a manner that would otherwise be prohibited by this chapter.

VIOLATION: The failure of a structure or other development to be fully compliant with this chapter. A structure or other development without the elevation certificate, other certification, or other evidence of compliance required by this chapter is presumed to be in violation until such time as that documentation is provided.

WATER SURFACE ELEVATION: The height, in relation to the national geodetic vertical datum (NGVD) of 1929 (or the datum, where specified), of floods of various magnitudes and frequencies in the floodplains of coastal or riverine areas.

WATERCOURSE: A lake, river, creek, stream, wash, arroyo, channel or other topographic feature on or over which waters flow at least periodically. Watercourse includes specifically designated areas in which substantial flood damage may occur."

SECTION 2. Section 15.32.040 of Chapter 15.32 of the Redlands Municipal Code, entitled "Establishing the Areas of Special Flood Hazard," is hereby amended to read as follows:

"15.32.040: ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD:

The areas of special flood hazard identified by the federal insurance administration (FIA) of the federal emergency management agency (FEMA) in the "Flood Insurance Study (FIS) for San Bernardino County, California and Incorporated Areas" dated January 17, 1997, with accompanying flood insurance rate maps (FIRMs) and flood boundary and floodway maps (FBFMs), dated January 3, 1979, and all subsequent amendments and/or revisions, are adopted by reference and declared to be a part of this chapter. This flood insurance study (FIS) and attendant mapping is the minimum area of applicability of this chapter and may be supplemented by studies for other areas which allow implementation of this chapter and which are recommended to the city council by the chief building official. The study, FIRMs and FBFMs are on file at 35 Cajon Street, Suite 20, department of building and safety."

SECTION 3. Section 15.32.080 of Chapter 15.32 of the Redlands Municipal Code, entitled "Warning and Disclaimer of Liability," is hereby amended to read as follows:

"15.32.080: WARNING AND DISCLAIMER OF LIABILITY:

The degree of flood protection required by this chapter is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on occasions and flood heights may be increased by manmade or natural causes. This chapter does not imply that land outside the areas of special flood hazards, or uses permitted within such areas will be free from flooding or flood damages. This chapter shall not create liability on the part of the city, any elected official, officer or employee thereof, the state of California, or the federal insurance administration, federal emergency management agency, for any flood damages that result from reliance on this chapter or any rule or regulation made pursuant to this chapter.

If any section, provision or portion of the ordinance is deemed unconstitutional or invalid by a court, the remainder of the ordinance shall be effective."

SECTION 4. Section 15.32.100 of Chapter 15.32 of the Redlands Municipal Code, entitled "Chief Building Official; Duties and Responsibilities," is hereby amended to read as follows:

"15.32.100: CHIEF BUILDING OFFICIAL; DUTIES AND RESPONSIBILITIES:

The chief building official, as the designated floodplain administrator, shall administer, implement, and enforce this chapter by granting or denying development permits in accordance with its provisions and the chief building official duties and responsibilities shall include, but not be limited to:

A. Permit Review:

1. Review all development permits to determine that the permit requirements of this chapter have been satisfied;

2. Ensure that all other state and federal permits have been obtained;

3. Determine that the site is reasonably safe from flooding; and

4. The proposed development within zones A1-30 and AE without a designated floodway does not adversely affect the carrying capacity of areas where base flood elevations have been determined but a floodway has not been designated. For purposes of this chapter, “adversely affects” means that the cumulative effect of the proposed development when combined with all other existing and anticipated development will increase the water surface elevation of the base flood more than one foot (1’) at any point.

B. Review, Use And Development Of Other Base Flood Data:

1. When base flood elevation data has not been provided in accordance with section 15.32.040 of this chapter, the chief building official shall obtain, review and utilize any base flood elevation and floodway data available from a federal, state or other sources, or if no base flood elevation data is available from a federal or state agency or other source, in order to administer section 15.32.110 of this chapter. Any such information shall be submitted to the city for adoption; or

2. If no base flood elevation data is available from a federal or state agency or other source, then a base flood elevation shall be obtained using one of the two (2) methods from the FEMA publication "Managing Floodplain Development In Approximate Zone A Areas-A Guide Of Obtaining And Developing Base (100-Year) Flood Elevations" dated July 1995, in order to administer section 15.32.110 of this chapter.

a. Simplified method:

(1) 100-year or base flood discharge shall be obtained using the appropriate regression equation found in a U.S. geological survey publication, or the discharge-drainage area method; and

(2) Base flood elevation shall be obtained using the Quick-2 computer program developed by FEMA; or

b. Detail method:

(1) 100-year or base flood discharge shall be obtained using the U.S. army corps of engineers' HEC-HMS computer program; and

(2) Base flood elevation shall be obtained using the U.S. army corps of engineers' HEC-RAS computer program.

C. Notification Of Other Agencies:

1. In alteration or relocation of a watercourse:

a. Notify adjacent communities and the California department of water resources prior to alteration or relocation;

b. Submit evidence of such notification to the FEMA; and

c. Assure that the flood carrying capacity within the altered or relocated portion of said watercourse is maintained.

2. Base Flood Elevation Changes Due To Physical Alterations:

a. Within six (6) months of information becoming available or project completion, whichever comes first, the floodplain administrator shall submit or assure that the permit applicant submits technical or scientific data to FEMA for a Letter of Map Revision (LOMR).

b. All LOMR's for flood control projects are approved prior to the issuance of building permits. Building permits must not be issued based on Conditional Letters of Map Revision (CLOMR's). Approved CLOMR's allow construction of the proposed flood control project and land preparation as specified in the "start of construction" definition.

Such submissions are necessary so that upon confirmation of those physical changes affecting flooding conditions, risk premium rates and floodplain management requirements are based on current data.

3. Changes In Corporate Boundaries:

a. Notify FEMA in writing whenever the corporate boundaries have been modified by annexation or other means and include a copy of a map of the community clearly delineating the new corporate limits.

D. Documentation Of Floodplain Development: Obtain and maintain for public inspection and make available as needed the following:

1. Certification required by sections 15.32.110 and 15.32.140 of this chapter (lowest floor elevations);

2. Certification required by subsection 15.32.110C4 of this chapter (elevation or floodproofing of nonresidential structures);

3. Certification of elevation required by subsection 15.32.110C5 of this chapter (wet floodproofing standards);

4. Certification of elevation required by section 15.32.130, "Subdivision Standards", of this chapter;

5. Certification required by section 15.32.160 of this chapter (floodway encroachments);

6. Reports required by section 15.32.170 of this chapter (mudflow standards).

E. Map Determinations: Make interpretations, where needed, as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions). Any person contesting the location of a boundary shall be given a reasonable opportunity to appeal the interpretation as provided in sections 15.32.180 and 15.32.190 of this chapter.

F. Remedial Action: Take action to remedy violations of this chapter."

SECTION 5. Section 15.32.110 of Chapter 15.32 of the Redlands Municipal Code, entitled "Construction Standards," is hereby amended to read as follows:

"15.32.110: CONSTRUCTION STANDARDS:

In all areas of special flood hazards the following standards are required:

A. Anchoring:

1. All new construction and substantial improvements shall be anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy.

2. All manufactured homes shall meet the anchoring standards of section 15.32.140 of this chapter.

B. Construction Materials And Methods:

1. All new construction and substantial improvements shall be constructed with flood resistant materials and utility equipment resistant to flood damage;

2. All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage;

3. All new construction and substantial improvements shall be constructed with electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding by elevating said equipment by at least one foot (1') above the base flood elevation; and

4. If within zone AH or AO, adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures.

C. Elevation And Floodproofing:

1. Residential construction, new or substantial improvement of any structure in zone AE, AH, or A1-30 shall have the lowest floor, including basement, elevated two feet (2') above the base flood elevation. Upon the completion of the structure the elevation of the lowest floor including basement shall be certified by a registered professional engineer or surveyor, or verified by the chief building official to be properly elevated.

2. Residential construction, new or substantial improvement, of any structure in zone AO shall have the lowest floor, including basement, elevated above the highest adjacent grade to a height exceeding the depth number specified in feet on the FIRM by at least two feet (2'), or elevated at least four feet (4') above the highest adjacent grade if no depth number is specified. Upon the completion of the structure, the elevation of the lowest floor including basement shall be certified by a registered professional engineer or surveyor, or by the chief building official to be properly elevated.

3. Residential construction, new or substantial improvement of any structure in zone A shall have the lowest floor, including basement, be elevated at least two feet (2') above the base flood elevation. Upon the completion of the structure, the elevation of the lowest floor including basement shall be certified by a registered professional engineer or surveyor, or by the chief building official to be properly elevated.

4. Nonresidential construction, new or substantial improvement, in AO zones shall either be elevated in conformance with subsection C1 or C2 of this section or together with attendant utility and sanitary facilities be floodproofed to at least two feet (2') above the BFE so that below this level the structure is watertight with walls substantially impermeable to the passage of water, have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy, and be certified by a registered professional engineer or architect that the standards of this subsection are satisfied. Such certifications shall be provided to the chief building official.

5. All new construction and substantial improvements, that fully enclose areas below the lowest floor (excluding basements) that are usable solely for parking of vehicles, building access or storage, and which are subject to flooding, shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement shall either be certified by a registered professional engineer or architect and must meet or exceed the following minimum criteria:

a. Have a minimum of two (2) openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding. The bottom of all openings shall be no higher than one foot (1') above grade. Openings may be equipped with screens, louvers, valves or other coverings or devices; provided, that they permit the automatic entry and exit of floodwaters; or

b. Be certified by a registered professional engineer or architect.

6. Manufactured homes shall satisfy the standards in section 15.32.140 of this chapter."

SECTION 6. Section 15.32.130 of Chapter 15.32 of the Redlands Municipal Code, entitled "Subdivision Standards," is hereby amended to read as follows:

“15.32.130: SUBDIVISION STANDARDS:

A. All preliminary subdivision proposals greater than 50 lots or 5 acres shall identify the special flood hazard area and the elevation of the base flood.

B. All final subdivision plans shall provide the elevation of proposed structures and pads. If the site is filled above the base flood elevation, the lowest floor and pad elevation shall be certified by a registered professional engineer or surveyor and provided to the chief building official.

C. All subdivision proposals shall be consistent with the need to minimize flood damage.

D. All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize flood damage by dry floodproofing and elevating equipment by at least one foot (1’) above the base flood elevation.

E. All subdivisions shall provide adequate drainage to reduce exposure to flood hazards.”

SECTION 7. Section 15.32.140 of Chapter 15.32 of the Redlands Municipal Code, entitled “Standards for Manufactured Homes,” is hereby amended to read as follows:

“15.32.140: STANDARDS FOR MANUFACTURED HOMES:

A. All manufactured homes that are placed or substantially improved within zones A1-30, AH, and AE on the community's flood insurance rate map, on sites located: 1) outside of a manufactured home park or subdivision; 2) in a new manufactured home park or subdivision; 3) in an expansion to an existing manufactured home park or subdivision; 4) in an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood, shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated to at least two feet (2') above the base flood elevation and be securely fastened to an adequately anchored foundation system to resist flotation collapse and lateral movement.

B. All manufactured homes to be placed or substantially improved on sites in an existing manufactured home park or subdivision within zones A1-30, AH, and AE on the community's flood insurance rate map that are not subject to the provisions of subsection A of this section will be fastened to an adequately anchored foundation system to resist flotation, collapse, and lateral movement, and to be elevated so that either:

1. The lowest floor of the manufactured home is at least two feet (2') above the base flood elevation.”

SECTION 8. Section 15.32.160 of Chapter 15.32 of the Redlands Municipal Code, entitled “Floodways,” is hereby amended to read as follows:

“15.32.160: FLOODWAYS:

Located within areas of special flood hazard established in section 15.32.040 of this chapter are areas designated as regulatory floodways. Because the regulatory floodway is an

extremely hazardous area due to the velocity of floodwaters which carry debris, potential projectiles and erosion potential, the following provisions shall apply:

A. Prohibit encroachments, including fill, new construction, substantial improvements, and other development unless certification by a registered professional engineer or architect is provided demonstrating that encroachments shall not result in any increase in the base flood levels during the occurrence of the base flood discharge.

B. If the above is satisfied, all new construction, substantial improvements, and proposed development shall comply with all other applicable flood hazard reduction provisions of this chapter."

SECTION 9. Environmental Determination. The City Council has reviewed the matter and, based upon the facts and information contained in the staff report, administrative record, and written and oral testimony, hereby finds that this ordinance is not subject to the California Environmental Quality Act (CEQA) pursuant to Sections 15061(b)(3) and 15378(b)(5) of the State CEQA Guidelines, in that it will not result in a direct or reasonably foreseeable indirect physical change on the environment nor have a significant impact on the environment.

SECTION 10. Severability. If any section, subsection, subdivision, sentence, clause, phrase, or portion of this Ordinance for any reason is held to be invalid or unconstitutional by the decision of any court of competent jurisdiction, such decision shall not affect the validity of the remaining portions of this Ordinance. The City Council hereby declares that it would have adopted this Ordinance, and each section, subsection, subdivision, sentence, clause, phrase, or portion thereof, irrespective of the fact that any one or more sections, subsections, subdivisions, sentences, clauses, phrases, or portions thereof be declared invalid or unconstitutional.

SECTION 11. The Mayor shall sign this ordinance and the City Clerk shall certify to the adoption of this ordinance and shall cause it, or a summary of it, to be published once in a newspaper of general circulation within the City, and thereafter, this ordinance shall take effect as provided by law.

_____

Mario Saucedo, Mayor

ATTEST:

_____

Jeanne Donaldson, City Clerk

I, Jeanne Donaldson, City Clerk, City of Redlands, hereby certify that the foregoing Ordinance was duly adopted by the City Council at the regular meeting thereof, held on the _____ day of _____, 2025, by the following vote:

AYES:
NOES:
ABSENT:
ABSTAIN:

_____

Jeanne Donaldson, City Clerk

City Council Meeting **J. 2.**

DATE: 10/21/2025

TO: Honorable Mayor and City Council Members

SUBJECT: Consideration of the adoption of Ordinance No. 2990 - Authorizing an amendment to the contract between the City Council of Redlands and the Board of Administration of the California Public Employees' Retirement System (Human Resources/Risk Management Director Meteau)

MOTION(S):

If the City Council determines that staff's recommendation is appropriate, the following motion is provided:

I move to adopt Ordinance No. 2990.

RECOMMENDATION:

It is recommended the City Council consider adoption of Ordinance No. 2990, authorizing an amendment to the contract between the City Council of Redlands and the Board of Administration of the California Public Employees' Retirement System (CalPERS).

DISCUSSION:

The proposed ordinance and staff report prepared for the introduction of this ordinance is available in the City Clerk's office.

ALTERNATIVES:

The City Council may choose to take no action. However, this would result in no changes to the City's contract with CalPERS, and would not consider the recommendation provided directly by CalPERS.

STRATEGIC PLAN:

Not Applicable

SUBMITTED BY:
Jeanne Donaldson, City Clerk

RECOMMENDED BY:
Charles M. Duggan Jr., City Manager

REVIEWED BY:
Yvette M. Abich Garcia, City Attorney
Janice McConnell, Assistant City Manager
Danielle Garcia, Management Services/Finance Director

PREPARED BY:
Altheresa Rothschild, Assistant City Clerk

Fiscal Impact

Discussion:

Codification: $22/per page affected by the change
Legal Publication: $290

Attachments

Ordinance No. 2990 Amendment to CalPERS Contract
Exhibit A - Contract Amendment

ORDINANCE NO. 2990

AN ORDINANCE OF THE CITY OF REDLANDS AUTHORIZING AN AMENDMENT TO THE CONTRACT BETWEEN THE CITY COUNCIL OF THE CITY OF REDLANDS AND THE BOARD OF ADMINISTRATION OF THE CALIFORNIA PUBLIC EMPLOYEES' RETIREMENT SYSTEM

WHEREAS, it is the desire of the City Council of the City of Redlands to amend its contract with the Board of Administration of the California Public Employees' Retirement System (CalPERS) to remove language within its contract that excludes hourly employees from CalPERS membership; and

WHEREAS, at its regular meeting of September 16, 2025, the City Council of the City of Redlands adopted a Resolution of Intention to initiate the contract amendment process with the Board of Administration of the California Public Employees' Retirement System for the above stated purpose;

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF REDLANDS DOES ORDAIN AS FOLLOWS:

Section 1. That an amendment to the contract between the City Council of the City of Redlands and the Board of Administration of the California Public Employees' Retirement System is hereby authorized, a copy of said amendment being attached hereto, marked Exhibit "A," and by such reference made a part hereof as though herein set out in full.

Section 2. The Mayor of the City of Redlands is hereby authorized, empowered, and directed to execute said amendment for and on behalf of said agency.

Section 3. This ordinance shall take effect thirty (30) days after the date of its adoption, and prior to the expiration of fourteen (14) days from the passage thereof shall be published at least once in the Redlands Daily Facts, a newspaper of general circulation, published and circulated in the City of Redlands and thenceforth and thereafter the same shall be in full force and effect.

_____
Mario Saucedo, Mayor

ATTEST:

_____
Jeanne Donaldson, City Clerk

I, Jeanne Donaldson, City Clerk of the City of Redlands, hereby certify that the foregoing ordinance was duly adopted by the City Council at a regular meeting thereof held on the 21st day of October, 2025.

AYES:
NOES:
ABSTAIN:
ABSENT:

_____
Jeanne Donaldson, City Clerk

CalPERS

EXHIBIT

California
Public Employees' Retirement System

AMENDMENT TO CONTRACT

Between the
Board of Administration
California Public Employees' Retirement System
and the
City Council
City of Redlands

The Board of Administration, California Public Employees' Retirement System, hereinafter referred to as Board, and the governing body of the above public agency, hereinafter referred to as Public Agency, having entered into a contract effective July 1, 1945, and witnessed June 1, 1945, and as amended effective January 1, 1953, August 1, 1956, March 1, 1957, January 1, 1960, August 1, 1961, January 1, 1969, August 16, 1969, May 16, 1973, April 25, 1974, September 22, 1975, July 12, 1976, February 18, 1980, April 11, 1983, October 24, 1983, June 29, 1987, November 19, 1999, January 10, 2000, April 5, 2001, January 3, 2005, April 11, 2005, and February 6, 2009. which provides for participation of Public Agency in said System, Board and Public Agency hereby agree as follows:

A. Paragraphs 1 through 12 are hereby stricken from said contract as executed effective February 6, 2009, and hereby replaced by the following paragraphs numbered 1 through 16 inclusive:

1. All words and terms used herein which are defined in the Public Employees' Retirement Law shall have the meaning as defined therein unless otherwise specifically provided. "Normal retirement age" shall mean age 55 for classic local miscellaneous members, age 62 for new local miscellaneous members, age 50 for classic local safety members, and 57 for new local safety members.

2. Public Agency shall participate in the Public Employees' Retirement System from and after July 1, 1945, making its employees as hereinafter provided, members of said System subject to all provisions of the Public Employees' Retirement Law except such as apply only on election of a contracting agency and are not provided for herein and to all amendments to said Law hereafter enacted except those, which by express provisions thereof, apply only on the election of a contracting agency.

3. Public Agency agrees to indemnify, defend and hold harmless the California Public Employees' Retirement System (CalPERS) and its trustees, agents and employees, the CalPERS Board of Administration, and the California Public Employees' Retirement Fund from any claims, demands, actions, losses, liabilities, damages, judgments, expenses and costs, including but not limited to interest, penalties and attorney fees that may arise as a result of any of the following:

   (a) Public Agency's election to provide retirement benefits, provisions or formulas under this Contract that are different than the retirement benefits, provisions or formulas provided under the Public Agency's prior non-CalPERS retirement program.

   (b) Any dispute, disagreement, claim, or proceeding (including without limitation arbitration, administrative hearing, or litigation) between Public Agency and its employees (or their representatives) which relates to Public Agency's election to amend this Contract to provide retirement benefits, provisions or formulas that are different than such employees' existing retirement benefits, provisions or formulas.

   (c) Public Agency's agreement with a third party other than CalPERS to provide retirement benefits, provisions, or formulas that are different than the retirement benefits, provisions or formulas provided under this Contract and provided for under the California Public Employees' Retirement Law.

4. Employees of Public Agency in the following classes shall become members of said Retirement System except such in each such class as are excluded by law or this agreement:

   a. Local Fire Fighters (herein referred to as local safety members);

   b. Local Police Officers (herein referred to as local safety members);

   c. Employees other than local safety members (herein referred to as local miscellaneous members).

5. In addition to the classes of employees excluded from membership by said Retirement Law, the following classes of employees shall not become members of said Retirement System:

NO ADDITIONAL EXCLUSIONS

6. Removal of the exclusion of "Persons Compensated On An Hourly Basis Hired On Or After January 1, 1969," pursuant to Section 20503, is declarative of agency's previous interpretation and does not mandate any new classes of employees into membership.

7. The percentage of final compensation to be provided for each year of credited prior and current service for classic local miscellaneous members shall be determined in accordance with Section 21354 of said Retirement Law, subject to the reduction provided therein for service on and after January 1, 1956, the effective date of Social Security coverage, for members whose service has been included in Federal Social Security (2% at age 55 Full and Modified).

8. The percentage of final compensation to be provided for each year of credited prior and current service as a new local miscellaneous member shall be determined in accordance with Section 7522.20 of said Retirement Law (2% at age 62 Supplemental to Federal Social Security).

9. The percentage of final compensation to be provided for each year of credited prior and current service as a classic local safety member shall be determined in accordance with Section 21362.2 of said Retirement Law (3% at age 50 Full).

10. The percentage of final compensation to be provided for each year of credited prior and current service as a new local safety member shall be determined in accordance with Section 7522.25(d) of said Retirement Law (2.7% at age 57 Full).

11. Public Agency elected and elects to be subject to the following optional provisions:

    a. Section 21222.1 (One-Time 5% Increase - 1970). Legislation repealed said Section effective January 1, 1980.

    b. Section 21222.2 (One-Time 5% Increase - 1971). Legislation repealed said Section effective January 1, 1980.

    c. Sections 21624 and 21626 (Post-Retirement Survivor Allowance).

    d. Section 20614, Statutes of 1978, (Reduction of Normal Member Contribution Rate). From February 18, 1980, and until April 11, 1983, the normal local miscellaneous member contribution rate shall be 0%. Legislation repealed said Section effective September 29, 1980. From February 18, 1980, and until October 24, 1983, the normal member contribution rate shall be 7% for local fire members and 6% for local police members. Legislation repealed said Section effective September 29, 1980.

e. Section 20690, Statutes of 1980, (To Prospectively Revoke Section 20614, Statutes of 1978).

f. Section 20042 (One-Year Final Compensation) for classic members only.

g. Section 21024 (Military Service Credit as Public Service).

h. Section 20965 (Credit for Unused Sick Leave) for local miscellaneous members and local fire members only.

i. Section 20903 (Two Years Additional Service Credit).

j. Section 20503 (To Remove the Exclusion of "Persons Compensated On An Hourly Basis On Or After January 1, 1969, Prospectively from the effective date of this amendment to contract).

12. Public Agency, in accordance with Government Code Section 20790, ceased to be an "employer" for purposes of Section 20834 effective on February 18, 1980. Accumulated contributions of Public Agency shall be fixed and determined as provided in Government Code Section 20834, and accumulated contributions thereafter shall be held by the Board as provided in Government Code Section 20834.

13. Public Agency shall contribute to said Retirement System the contributions determined by actuarial valuations of prior and future service liability with respect to local miscellaneous members and local safety members of said Retirement System.

14. Public Agency shall also contribute to said Retirement System as follows:

a. A reasonable amount, as fixed by the Board, payable in one installment within 60 days of date of contract to cover the costs of administering said System as it affects the employees of Public Agency, not including the costs of special valuations or of the periodic investigation and valuations required by law.

b. A reasonable amount, as fixed by the Board, payable in one installment as the occasions arise, to cover the costs of special valuations on account of employees of Public Agency, and costs of the periodic investigation and valuations required by law.

15. Contributions required of Public Agency and its employees shall be subject to adjustment by Board on account of amendments to the Public Employees' Retirement Law, and on account of the experience under the Retirement System as determined by the periodic investigation and valuation required by said Retirement Law.

16. Contributions required of Public Agency and its employees shall be paid by Public Agency to the Retirement System within fifteen days after the end of the period to which said contributions refer or as may be prescribed by Board regulation. If more or less than the correct amount of contributions is paid for any period, proper adjustment shall be made in connection with subsequent remittances. Adjustments on account of errors in contributions required of any employee may be made by direct payments between the employee and the Board.

B. This amendment shall be effective on the _____ day of _____, _____.

BOARD OF ADMINISTRATION
PUBLIC EMPLOYEES' RETIREMENT SYSTEM

BY _____
MELODY BENAVIDES, CHIEF
PENSION CONTRACTS AND PREFUNDING
PROGRAMS DIVISION
PUBLIC EMPLOYEES' RETIREMENT SYSTEM

CITY COUNCIL
CITY OF REDLANDS

BY _____
PRESIDING OFFICER

_____
Witness Date

Attest:

_____
Clerk

PLEASE DO NOT SIGN "EXHIBIT ONLY"
PLEASE DO NOT SIGN "EXHIBIT ONLY"

City Council Meeting **J. 3.**

DATE: 10/21/2025

TO: Honorable Mayor and City Council Members

SUBJECT: Consideration of a Public Works Construction Contract with Demo Leaders, Inc. for the WWTP Hillside Stabilization Project for an amount not-to-exceed $299,828.44, and determination that the Project is categorically exempt from environmental review pursuant to Section 15301 of the State's guidelines implementing the California Environmental Quality Act (Municipal Utilities and Engineering Director Harris)

MOTION(S):

If City Council determines the staff recommendation is appropriate, the following motions are provided:

1. I move that the City Council determine that approval of a Public Works Construction Contract with Demo Leaders, Inc. for the WWTP Hillside Stabilization Project is categorically exempt from environmental review pursuant to Section 15301 of the State's guidelines implementing the California Environmental Quality Act; and

2. I move that the City Council approve the WWTP Hillside Stabilization Project plans and specifications, and award a Public Works Construction Contract to Demo Leaders, Inc. for an amount not-to-exceed $299,828.44.

RECOMMENDATION:

Staff recommends City Council determine approval of a Public Works Construction Contract with Demo Leaders, Inc. for the WWTP Hillside Stabilization and Stairway Improvements Project is categorically exempt from environmental review pursuant to Section 15301 of the State's guidelines implementing the California Environmental Quality Act. Staff further recommends City Council approval of the WWTP Hillside Stabilization and Stairway Improvements Project plans and specifications, and award a Public Works Construction Contract to Demo Leaders, Inc. for an amount

not-to-exceed $299,828.44.

DISCUSSION:

The City of Redlands' Wastewater Treatment Plant (WWTP) includes hillside and slope areas that have experienced progressive erosion, creating sediment runoff issues and impacting access routes for operational personnel. To address these concerns, the City tasked our on-call engineering service consultant, Hicks and Hartwick, to assess site conditions, develop conceptual alternatives, and deliver the final design, plans, and specifications for slope stabilization and access improvements.

The proposed improvements consist of constructing retaining walls of varying heights, v-ditch, v-drains, u-ditch, grate inlets, a concrete block slough wall, and a reinforced concrete stairway. Landscaping and irrigation will be incorporated to improve slope stability, control erosion, and integrate the improvements into the surrounding environment. This project will provide long-term slope stability, protect nearby infrastructure, and improve access for wastewater personnel. The improvements are consistent with industry standards and will reduce future maintenance while enhancing the overall functionality and aesthetics of the WWTP site.

In July 2025, the City's consultant finalized the plans and specifications, and MUED staff advertised the project for construction. On August 28, 2025, the City Clerk's office received and opened the following twelve (12) bids:

BID OPENING REPORT SUMMARY	
BIDDER	**BID AMOUNT**
1. Demo Leaders, Inc., Woodland Hills, CA	*$299,828.44
2. R&J Construction LLC., Mentone, CA	*$401,004.00
3. Inland Highway Services Corp., Upland, CA	$496,490.00
4. Leonida Builders, Inc., Acton, CA	$553,627.00
5. Seed Landcare, Inc., Los Angeles, CA	$572,414.00
6. Tryco General Engineering, Rimforest, CA	$610,280.00
7. H L Hitchcock Construction, Inc., Rancho Cucamonga, CA	*$659,232.00
8. Jergensen Concrete, Inc., Phelan, CA	**$753,489.90
9. Narrow Path Engineering, Inc., Beaumont, CA	**$758,184.50
10. Wright Construction Engineering Corp, San Marcos, CA	$761,315.00
11. Spec Construction Co., Inc., Ontario, CA	*$817,692.00
12. Gentry General Engineering, Inc., Colton, CA	$896,169.50

*An arithmetic error was discovered in the bid proposal. The total bid amount was corrected and highlighted in the attached bid analysis, but it did not affect the ranking.
**An arithmetic error was discovered in the bid proposal. The total bid amount was corrected and highlighted in the attached bid, which affected the ranking.

MUED staff reviewed each bid and determined that Demo Leaders, Inc. is the lowest responsive and responsible bidder. Therefore, staff recommends City Council approval of a Public Works Construction Contract with Demo Leaders, Inc. for an amount not-to-exceed $299,828.44. If approved, it is anticipated that the project will be completed within sixty (60) working days after a Notice to Proceed is issued.

This project is categorically exempt from environmental review pursuant to Section 15301 of the State's guidelines implementing the California Environmental Quality Act (CEQA) as the project involves negligible or no expansion of capacity.

ALTERNATIVES:

City Council may reject the staff recommendation and provide alternate direction.

STRATEGIC PLAN:

N/A

SUBMITTED BY:
John R. Harris, Municipal Utilities and Engineering Director

RECOMMENDED BY:
Charles M. Duggan Jr., City Manager

REVIEWED BY:
Yvette M. Abich Garcia, City Attorney
Janice McConnell, Assistant City Manager
Danielle Garcia, Management Services/Finance Director
Goutam K. Dobey, City Engineer

PREPARED BY:
Gerard Nepomuceno, Civil Engineer

Fiscal Impact

Fiscal Year: FY 25/26

Appropriation Required Y/N: No

Budgeted Y/N: Yes

Account No.: 521910

Discussion:

There is no fiscal impact associated with this action. The cost for this project is included in the FY 25/26 MUED Budget.

Attachments

A. Demo Leaders Public Works Contract

B. Bid Opening Report

C. Bid Analysis

D. Site Map

Project Plans

Project Specifications

PUBLIC WORK CONSTRUCTION CONTRACT

This Public Work Construction contract ("Contract") is made and entered into this 21st day of October, 2025, by and between the City of Redlands, a municipal corporation, organized and existing under the laws of the State of California (hereinafter "City"), and Demo Leaders, Inc., a California corporation (hereinafter "Contractor"). City and Contractor are sometimes individually referred to herein as a "Party" and, together, as the "Parties."

In consideration of the mutual promises contained herein, City and Contractor agree as follows:

1. **SCOPE OF WORK:** Contractor shall furnish all materials and will perform all of the work for the following: WWTP Hillside Stabilization and Stairway Improvements Project, Project No. 521038, complete all items as required by the Contract Documents (as herein defined) and Specifications for City's WWTP Hillside Stabilization and Stairway Improvements Project, Project No. 521038 (the "Work").

2. **CONTRACT SUM:** City shall pay Contractor the sum of two hundred ninety-nine thousand eight hundred twenty-eight dollars and forty-four cents dollars ($299,828.44) as consideration for its performance of the Work in accordance with the terms and conditions set forth in the Contract Documents. Pursuant to Public Contract Code Section 22300, Contractor has the option to deposit securities with an escrow agent as a substitute for retention of earnings required to be withheld by City pursuant to an escrow agreement as set forth in Public Contract Code section 22300.

3. **TIME FOR COMPLETION:** The Work shall be completed within sixty (60) working day(s) as defined in Section 1-2 of the Standard Specifications for Public Works Construction "Greenbook" from and after the date of City's issuance of a Notice to Proceed to Contractor.

4. **LIQUIDATED DAMAGES:** Contractor's failure to complete the Work within the time allowed will result in damages being sustained by City. Such damages are, and will continue to be, impracticable and extremely difficult to determine. Accordingly, Contractor shall pay to City, or have withheld from monies due to Contractor, the sum of five hundred dollars ($500) for each working day as defined in Section 1-2 of the Standard Specifications for Public Works Construction "Greenbook" in excess of the specified time for completion of the Work. Execution of this Contract shall constitute agreement by City and Contractor that five hundred dollars ($500) per day is the estimated damage to City caused by the failure of Contractor to complete the work within the allowed time. Such sum is liquidated damages and shall not be construed as a penalty, and may be deducted from payments due Contractor if such delay occurs.

5. **CONTRACT DOCUMENTS:** This Contract incorporates by reference the following: Notice Inviting Bids, Instructions to Bidders, Contractor's Proposal, Bid Bond, Agreement, Performance Bond, Labor and Material Bond, Plans, General Conditions, Special Provisions and Specifications, and any addenda thereto (collectively, the "Contract Documents").

6. **ATTORNEYS' FEES:** In the event any action is commenced to enforce or interpret the terms or conditions of this Contract, or the Contract Documents, the prevailing Party in such action, in addition to any costs and other relief, shall be entitled to recover its reasonable attorneys' fees, including fees for use of in-house counsel by a Party.

7. **RESOLUTION OF CONSTRUCTION CLAIMS:** Claims by Contractor in the amount of three hundred seventy-five thousand dollars ($375,000) or less shall be made by Contractor and processed by the City pursuant to the provisions of Part 3, Chapter 1, Article 1.5 of the Public

Contract Code (commencing with Section 20104). All claims shall be in writing and include the documents necessary to substantiate the claim. Nothing in subdivision (a) of Public Contract Code Section 20104.2 shall extend the time limit or supersede the notice requirements provided in this case from filing claims by Contractor.

8. **ELIGIBILITY OF CONTRACTOR/SUBCONTRACTOR:** Contractor and all of its subcontractors shall abide by California Public Contract Code, Section 6109, and California Labor Code Sections 1777.1 and/or 1777.7, and certify that they are not debarred and are eligible to work on this project.

9. **ASSIGNMENT OF AGREEMENT:** No assignment by a Party of any rights or interests under this Contract shall be binding on another Party without the written consent of the Party sought to be bound.

10. **SUCCESSORS AND ASSIGNS:** City and Contractor each binds itself and their respective successors and assigns in respect to all covenants, agreements, and obligations contained in the Contract Documents.

11. **SEVERABILITY:** Any provision or part of the Contract Documents held to be void or unenforceable under any law or regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon City and Contractor.

IN WITNESS WHEREOF, the Parties hereto have executed this Contract the day and year first written above.

CITY OF REDLANDS

(SEAL)

By:_____
Mario Saucedo, Mayor

ATTEST:

_____
Jeanne Donaldson, City Clerk

(SEAL)

___Demo Leaders, Inc._____
Name of Contractor

By:_____
Signature of Authorized Agent

___Yanir Ruham, CEO_____
Title

_____
Signature of Authorized Agent (if necessary)

_____
Title

_____
Contractor's License No.

WORKER'S COMPENSATION INSURANCE CERTIFICATION

Description of Contract: City of Redlands
Municipal Utilities and Engineering Department
WWTP Hillside Stabilization and Stairway
Improvements Project
Project No. 521038

Every employer, except the State, shall secure the payment of compensation in one or more of the following ways:

a. By being insured against liability to pay compensation by one or more insurers duly authorized to write compensation insurance in this State.
b. By securing from the Director of Industrial Relations, a certificate of consent to self-insure, either as an individual employer, or as one employer in a group of employers, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his or her employees.

CHECK ONE

_____I am aware of the provisions of Section 3700 of the Labor Code which requires every employer to be insured against liability for Workers' Compensation or to undertake self-insurance in accordance with the provisions of that Code, and I will comply with such provisions before commencing the performance of the work and activities required or permitted under this Agreement. (Labor Code §1861).

_____I affirm that at all times, in performing the work and activities required or permitted under this Agreement, I shall not employ any person in any manner such that I become subject to the workers' compensation laws of California. However, at any time, if I employ any person such that I become subject to the workers' compensation laws of California, immediately I shall provide the City with a certificate of consent to self-insure, or a certification of workers' compensation insurance.

I certify under penalty of perjury under the laws of the State of California that the information and representations made in this certificate are true and correct.

Dated this _____ day of _____, 2025.

__Demo Leaders, Inc._____
(Contractor)

_____
(Signature)

__Yanir Ruham, CEO _____
(Official Title)

(SEAL)

(Labor Code Section 1861 provides that the above certificate must be signed and filed by the Contractor with the Owner prior to performing the work of the contract.)

FAITHFUL PERFORMANCE BOND

Whereas, the City of Redlands ("City"), State of California, and Demo Leaders, Inc. (hereinafter designated as "Principal") have entered into an agreement dated October 21, 2025 ("Agreement") whereby Principal agrees to install and complete certain public improvements (the "Work"), which said Agreement is identified as WWTP Hillside Stabilization and Stairway Improvements Project, Project No. 521038 and is hereby referred to and made a part hereof; and

Whereas, said Principal is required under the terms of the Agreement to furnish a bond for the faithful performance of the Work, now, therefore, we, the Principal and, _____, as Surety, are held and firmly bound unto the City in the penal sum of two hundred ninety nine thousand eight hundred twenty eight dollars and forty four cents dollars ($299,828.44) lawful money of the United States, for the payment of which sum we bind ourselves, and our heirs, successors, executors and administrators, jointly and severally, firmly by these presents.

The condition of this obligation is such that if the above bounded Principal, his or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and provisions in the Agreement and any alteration thereof made as therein provided, on his or its part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall faithfully fulfill the one-year guarantee of all materials and workmanship, and shall defend, indemnify and save harmless the City and its elected officials, officers, agents and employees, as therein stipulated, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect.

As a part of the obligation secured hereby and in addition to the face amount specified therefor, there shall be included costs and reasonable expenses and fees, including reasonable attorneys' fees, incurred by the City in successfully enforcing such obligations, all to be taxed as costs and included in the judgment rendered.

As a condition precedent to the satisfactory completion of the Work, the above obligation shall hold good for a period of one (1) year or longer if required by the Agreement after the acceptance of the work by the City, during which time if the Principal shall fail to make full, complete, and satisfactory repair and replacements and totally protect the City from loss or damage made evident during this period from the date of completion of the Work, and resulting from or caused by defective materials or faulty workmanship, the above obligation in penal sum thereof shall remain in full force and effect. The obligations of Surety hereunder shall continue so long as any obligation of the Principal remains.

Whenever the Principal shall be, and is declared by the City to be, in default under the Agreement, the City having performed the City obligations thereunder, the Surety shall promptly remedy the default, or shall promptly, at the City's option:

1. Complete the Work in accordance with its terms and conditions; or

2. Obtain a bid or bids for completing the Work in accordance with its terms and conditions, and upon determination by Surety of the lowest responsive and responsible bidder, arrange for a contract between such bidder and the City, and make available as work progresses sufficient funds to pay the cost of completion of the Work less the balance of the Agreement price, but not exceeding, including other costs and damages for which Surety may be liable hereunder, the

amount set forth above. The term "balance of the Agreement price," as used in this paragraph, shall mean the total amount payable to the Principal by the City under the Agreement and any modifications thereto, less the amount previously properly paid by the City to the Principal.

Surety expressly agrees that the City may reject any contractor or subcontractor which may be proposed by Surety in fulfillment of its obligations in the event of default by the Principal.

Surety shall not utilize the Principal in completing the Work nor shall Surety accept a bid from the Principal for completion of the Work if the City, when declaring the Principal in default, notifies Surety of the City's objection to the Principal's further participation in the completion of the Work.

No right of action shall accrue on the bond to or for the use of any person or corporation other than the City named herein or the successors or assigns of the City. Any suit under this bond must be instituted within the applicable statute of limitations period.

The said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Agreement or to the work to be performed thereunder or the Specifications accompanying the same shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Agreement or to the work or to the specifications.

No final settlement between the City and the Principal shall abridge the right of any beneficiary hereunder whose claim may be unsatisfied.

The Principal and Surety agree that if the City is required to engage the services of any attorney in connection with the enforcement of this bond, each shall pay the City's reasonable attorneys' fees incurred, with or without suit, in addition to the above sum.

In witness whereof, this instrument has been duly executed by the Principal and Surety above named, on _____, 2025.

(SEAL)	(SEAL)
_____	_____
(Contractor)	(Surety)
_____	BY: _____
(Signature)	(Signature)
	Address:_____
	_____
(Seal and Notarial Acknowledgment of Surety)	Telephone ( )_____

LABOR AND MATERIAL BOND

Whereas, the City Council of the City of Redlands, State of California, and Demo Leaders, Inc. (hereinafter designated as "Principal") have entered into an agreement (the "Agreement") whereby Principal agrees to install and complete certain designated public improvements (the "Work"), which said agreement, dated October 21, 2025, and identified as WWTP Hillside Stabilization and Stairway Improvements Project, Project No. 521038 is hereby referred to and made a part hereof; and

Whereas, under the terms of the Agreement, Principal is required before commencing the performance of the Work, to file a good and sufficient Labor and Material bond with the City of Redlands to secure the claims to which reference is made in Title 3 (commencing with Section 9550) of Part 6 of Division 4 of the Civil Code of the State of California.

Now, therefore, said Principal and the undersigned as corporate surety, are held firmly bound unto the City and all contractors, subcontractors, laborers, material men and other persons employed in the performance of the Agreement and referred to in the aforesaid Code of Civil Procedure in the sum of two hundred ninety nine thousand eight hundred twenty eight dollars and forty four cents dollars ($299,828.44) for materials furnished or labor thereon of any kind, or for amounts due under the Unemployment Insurance Act with respect to such work or labor, that said surety will pay the same in an amount not exceeding the amount hereinabove set forth, and also in case suit is brought upon this bond, will pay, in addition to the face amount thereof, costs and reasonable expenses and fees, including reasonable attorneys' fees, incurred by the City in successfully enforcing such obligation, to be awarded and fixed by the court, and to be taxed as costs and to be included in the judgment therein rendered.

It is hereby expressly stipulated and agreed that this bond shall insure to the benefit of any and all persons, companies and corporations entitled to file claims under Title 3 (commencing with Section 9550) of Part 6 of Division 4 of the Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond.

Should the condition of this bond be fully performed, then this obligation shall become null and void, otherwise it shall be and remain in full force and effect.

The surety hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Agreement or the specifications accompanying the same shall in any manner affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition.

In witness whereof, this instrument has been duly executed by the Principal and surety above named, on _____, 2025.

(SEAL)	(SEAL)
_____	_____
(Contractor)	(Surety)
	BY:
_____	_____
(Signature)	(Signature)
	Address:_____
(Seal and Notarial Acknowledgement of Surety)	_____
	Telephone: ( )_____

CITY OF REDLANDS
OFFICE OF THE CITY CLERK
BID OPENING REPORT

The following bid was opened on the **28th day of August, 2025 at 2:00 p.m.** on behalf of the Municipal Utilities and Engineering Department for **WWTP Hillside Stabilization and Stairway Improvement Project. Project No. 521038.** The bid amounts have not been checked and are subject to correction after the bids have been completely reviewed.

No.	Plan Holder's Name	Bid Signed	Bid Bond	Addenda Issued (3)	Total Bid Amount
1	Demo Leaders Inc., Woodland, Hills, CA	Yes	Yes	Yes	$299,828.00
2	R&J Construction LLC, Mentone, CA	Yes	Yes	Yes	$396,972.00
3	Inland Highway Services Corp., Upland, CA	Yes	Yes	Yes	$496,490.00
4	Leonida Builders, Inc., Acton, CA	Yes	Yes	Yes	$553,627.00
5	Seed Landcare Inc., Los Angeles, CA	Yes	Yes	Yes	$572,354.00
6	Tryco General Engineering, Rimforest, CA	Yes	Yes	Yes	$610,280.00
7	H L Hitchcock Construction Inc., Rancho Cucamonga, CA	Yes	Yes	Yes	$613,001.00
8	Wright Construction Engineering Corp, San Marcos, CA	Yes	Yes	Yes	$761,315.00
9	Jergensen Concrete Inc., Phelan, CA	Yes	Yes	Yes	$762,993.90
10	Narrow Path Engineering Inc., Beaumont, CA	Yes	Yes	Yes	$765,829.50
11	Spec Construction Co., Inc., Ontario, CA	Yes	Yes	Yes	$815,192.00
12	Gentry General Engineering Inc., Colton, CA	Yes	Yes	Yes	$896,169.50

Altheresa Rothschild, Assistant City Clerk
City of Redlands, California

Emailed: Councilmembers,
City Manager, PIO, Press
Department Head: John Harris
Staff: Gerard Nepomuceno; Goutam Dobey

ATTACHMENT "C"

CITY OF REDLANDS
MUNICIPAL UTILITIES & ENGINEERING DEPARTMENT
BID ANALYSIS

PROJECT NO. 521038
WWTP Hillside Stabilization and Stairway Improvements Project

BID DATE: 28-Aug-2025
EST. START DATE: 27-Oct-2025

Item No.	Bid Item	Quantity	Unit	Demo Leaders, Inc.		RJ Construction		Inland Highway Services Corp.	
				Unit Price	Item Price	Unit Price	Item Price	Unit Price	Item Price
1	Mobilization (Maximum 5% of total bid price)	1	LS	$14,280.50	$14,280.50	$15,000.00	$15,000.00	$15,000.00	$15,000.00
2	SWPPP	1	LS	$3,900.00	$3,900.00	$1,000.00	$1,000.00	$4,000.00	$4,000.00
3	Construction Staking	1	LS	$5,200.00	$5,200.00	$3,000.00	$3,000.00	$20,000.00	$20,000.00
4	Retaining Wall (gray precision block)	352	LF	$152.10	$53,539.20	$314.00	$110,528.00	$100.00	$35,200.00
5	Concrete Block Slough Wall	178	LF	$132.63	$23,608.14	$120.00	$21,360.00	$80.00	$14,240.00
6	Reinforced Concrete Stairway	733	SF	$70.20	$51,456.60	$62.00	$45,446.00	$40.00	$29,320.00
7	Metal Hand Railings	231	LF	$110.50	$25,525.50	$60.00	$13,860.00	$30.00	$6,930.00
8	V-Ditch	336	LF	$81.90	$27,518.40	$85.00	$28,560.00	$50.00	$16,800.00
9	U-Channel	25	LF	$92.30	$2,307.50	$155.00	$3,875.00	$100.00	$2,500.00
10	Grate Inlets	8	EA	$1,105.00	$8,840.00	$300.00	$2,400.00	$1,500.00	$12,000.00
11	Stairway Lights (Solar)	4	EA	$1,560.00	$6,240.00	$4,000.00	$16,000.00	$12,500.00	$50,000.00
12	Landscape & Irrigation	1	LS	$15,600.00	$15,600.00	$86,000.00	$86,000.00	$170,000.00	$170,000.00
13	Construct 4" thick Concrete Slab	83	SF	$41.60	$3,452.80	$100.00	$8,300.00	$50.00	$4,150.00
14	Construct V-Drain	55	LF	$95.26	$5,239.30	$85.00	$4,675.00	$80.00	$4,400.00
15	Remove and Dispose of Existing V-Drain	65	LF	$41.60	$2,704.00	$100.00	$6,500.00	$30.00	$1,950.00
16	Construct Retaining Wall Utility Opening	5	EA	$780.00	$3,900.00	$500.00	$2,500.00	$4,000.00	$20,000.00
17	Earthwork and/or Export Material	300	CY	$32.50	$9,750.00		$0.00	$100.00	$30,000.00
18	Unforeseen Work	1	LS	$30,000.00	$30,000.00	$30,000.00	$30,000.00	$30,000.00	$30,000.00
19	Demobilization	1	LS	$6,766.50	$6,766.50	$2,000.00	$2,000.00	$30,000.00	$30,000.00
	Last Minute Additions/Deductions				$0.00		$0.00		$0.00
	Total Bid Price				**$299,828.44**		**$401,004.00**		**$496,490.00**
				Multiplication error in bid item 5 and 14. Total is corrected per item unit price		Multiplication error in bid item 6,14, and 17. Total is corrected per item unit price			
	License Status			Active		Active		Active	
	Sub's License Status			Active		N/A		Active	
	Bid Bond Company			Merchants National Bonding, Inc.		Old Republic Surety Company		American Contractors Undemnity Co.	
	Submitted Entire Bid Package			Yes		Yes		Yes	
	Submitted Sub's Qualification Statement			Yes		N/A		Yes	
	DIR Status			Active		Active		Active	
	Error in Bid			Yes		Yes		No	

CITY OF REDLANDS
MUNICIPAL UTILITIES & ENGINEERING DEPARTMENT
BID ANALYSIS

PROJECT NO. 521038
WWTP Hillside Stabilization and Stairway Improvements Project

BID DATE: 28-Aug-2025
EST. START DATE: 27-Oct-2025

Item No.	Bid Item	Quantity	Unit	Leonida Builders, Inc.		Seed Landcare, Inc.		Tryco General Engineering	
				Unit Price	Item Price	Unit Price	Item Price	Unit Price	Item Price
1	Mobilization (Maximum 5% of total bid price)	1	LS	$27,000.00	$27,000.00	$28,700.00	$28,700.00	$25,000.00	$25,000.00
2	SWPPP	1	LS	$14,000.00	$14,000.00	$11,514.00	$11,514.00	$14,000.00	$14,000.00
3	Construction Staking	1	LS	$10,000.00	$10,000.00	$7,260.00	$7,260.00	$14,000.00	$14,000.00
4	Retaining Wall (gray precision block)	352	LF	$350.00	$123,200.00	$428.00	$150,656.00	$340.00	$119,680.00
5	Concrete Block Slough Wall	178	LF	$250.00	$44,500.00	$140.00	$24,920.00	$400.00	$71,200.00
6	Reinforced Concrete Stairway	733	SF	$100.00	$73,300.00	$87.00	$63,771.00	$84.00	$61,572.00
7	Metal Hand Railings	231	LF	$90.00	$20,790.00	$208.00	$48,048.00	$180.00	$41,580.00
8	V-Ditch	336	LF	$50.00	$16,800.00	$92.00	$30,912.00	$113.00	$37,968.00
9	U-Channel	25	LF	$80.00	$2,000.00	$317.00	$7,925.00	$300.00	$7,500.00
10	Grate Inlets	8	EA	$1,000.00	$8,000.00	$921.00	$7,368.00	$600.00	$4,800.00
11	Stairway Lights (Solar)	4	EA	$10,000.00	$40,000.00	$9,912.00	$39,648.00	$8,000.00	$32,000.00
12	Landscape & Irrigation	1	LS	$85,000.00	$85,000.00	$81,111.00	$81,111.00	$102,000.00	$102,000.00
13	Construct 4" thick Concrete Slab	83	SF	$14.00	$1,162.00	$42.00	$3,486.00	$100.00	$8,300.00
14	Construct V-Drain	55	LF	$80.00	$4,400.00	$97.00	$5,335.00	$200.00	$11,000.00
15	Remove and Dispose of Existing V-Drain	65	LF	$15.00	$975.00	$44.00	$2,860.00	$112.00	$7,280.00
16	Construct Retaining Wall Utility Opening	5	EA	$500.00	$2,500.00	$988.00	$4,940.00	$200.00	$1,000.00
17	Earthwork and/or Export Material	300	CY	$100.00	$30,000.00	$68.00	$20,400.00	$58.00	$17,400.00
18	Unforeseen Work	1	LS	$30,000.00	$30,000.00	$30,000.00	$30,000.00	$30,000.00	$30,000.00
19	Demobilization	1	LS	$20,000.00	$20,000.00	$3,560.00	$3,560.00	$4,000.00	$4,000.00
	Last Minute Additions/Deductions				$0.00		$0.00		$0.00
			Total Bid Price		**$553,627.00**		**$572,414.00**		**$610,280.00**

CITY OF REDLANDS
MUNICIPAL UTILITIES & ENGINEERING DEPARTMENT
BID ANALYSIS

PROJECT NO. 521038
WWTP Hillside Stabilization and Stairway Improvements Project

BID DATE: 28-Aug-2025
EST. START DATE: 27-Oct-2025

Item No.	Bid Item	Quantity	Unit	HL Hitchcock Construction, Inc.		Wright Construction Engineering Corp.		Jergensen Concrete, Inc.	
				Unit Price	Item Price	Unit Price	Item Price	Unit Price	Item Price
1	Mobilization (Maximum 5% of total bid price)	1	LS	$18,750.00	$18,750.00	$38,000.00	$38,000.00	$13,800.00	$13,800.00
2	SWPPP	1	LS	$6,500.00	$6,500.00	$12,000.00	$12,000.00	$8,050.00	$8,050.00
3	Construction Staking	1	LS	$15,000.00	$15,000.00	$12,000.00	$12,000.00	$17,250.00	$17,250.00
4	Retaining Wall (gray precision block)	352	LF	$468.00	$164,736.00	$530.00	$186,560.00	$625.05	$220,017.60
5	Concrete Block Slough Wall	178	LF	$357.00	$63,546.00	$235.00	$41,830.00	$486.45	$86,588.10
6	Reinforced Concrete Stairway	733	SF	$85.00	$62,305.00	$150.00	$109,950.00	$51.75	$37,932.75
7	Metal Hand Railings	231	LF	$285.00	$65,835.00	$240.00	$55,440.00	$280.60	$64,818.60
8	V-Ditch	336	LF	$95.00	$31,920.00	$60.00	$20,160.00	$46.00	$15,456.00
9	U-Channel	25	LF	$65.00	$1,625.00	$400.00	$10,000.00	$51.75	$1,293.75
10	Grate Inlets	8	EA	$850.00	$6,800.00	$2,000.00	$16,000.00	$1,840.00	$14,720.00
11	Stairway Lights (Solar)	4	EA	$9,212.50	$36,850.00	$9,000.00	$36,000.00	$12,535.00	$50,140.00
12	Landscape & Irrigation	1	LS	$110,000.00	$110,000.00	$100,000.00	$100,000.00	$126,500.00	$126,500.00
13	Construct 4" thick Concrete Slab	83	SF	$45.00	$3,735.00	$100.00	$8,300.00	$20.70	$1,718.10
14	Construct V-Drain	55	LF	$85.00	$4,675.00	$170.00	$9,350.00	$86.25	$4,743.75
15	Remove and Dispose of Existing V-Drain	65	LF	$157.00	$10,205.00	$65.00	$4,225.00	$63.25	$4,111.25
16	Construct Retaining Wall Utility Opening	5	EA	$550.00	$2,750.00	$200.00	$1,000.00	$2,185.00	$10,925.00
17	Earthwork and/or Export Material	300	CY	$55.00	$16,500.00	$220.00	$66,000.00	$115.00	$34,500.00
18	Unforeseen Work	1	LS	$30,000.00	$30,000.00	$30,000.00	$30,000.00	$30,000.00	$30,000.00
19	Demobilization	1	LS	$7,500.00	$7,500.00	$4,500.00	$4,500.00	$10,925.00	$10,925.00
	Last Minute Additions/Deductions				$0.00		$0.00		$0.00
	Total Bid Price				**$659,232.00**		**$761,315.00**		**$753,489.90**
					Multiplication error in bid item 7. Total is corrected per item unit price				Multiplication error in bid item 4. Total is corrected per item unit price

ATTACHMENT "C"

CITY OF REDLANDS
MUNICIPAL UTILITIES & ENGINEERING DEPARTMENT
BID ANALYSIS

PROJECT NO. 521038
WWTP Hillside Stabilization and Stairway Improvements Project

BID DATE: 28-Aug-2025
EST. START DATE: 27-Oct-2025

Item No.	Bid Item	Quantity	Unit	Narrow Path Engineering, Inc.		Spec Construction Co, Inc.		Gentry General Engineering, Inc.	
				Unit Price	Item Price	Unit Price	Item Price	Unit Price	Item Price
1	Mobilization (Maximum 5% of total bid price)	1	LS	$34,300.00	$34,300.00	$38,818.00	$38,818.00	$7,500.00	$7,500.00
2	SWPPP	1	LS	$3,000.00	$3,000.00	$25,000.00	$25,000.00	$13,100.00	$13,100.00
3	Construction Staking	1	LS	$17,000.00	$17,000.00	$18,000.00	$18,000.00	$21,700.00	$21,700.00
4	Retaining Wall (gray precision block)	352	LF	$855.00	$300,960.00	$325.00	$114,400.00	$651.00	$229,152.00
5	Concrete Block Slough Wall	178	LF	$200.00	$35,600.00	$145.00	$25,810.00	$325.00	$57,850.00
6	Reinforced Concrete Stairway	733	SF	$55.00	$40,315.00	$67.00	$49,111.00	$85.00	$62,305.00
7	Metal Hand Railings	231	LF	$87.00	$20,097.00	$225.00	$51,975.00	$273.00	$63,063.00
8	V-Ditch	336	LF	$123.00	$41,328.00	$200.00	$67,200.00	$56.00	$18,816.00
9	U-Channel	25	LF	$144.00	$3,600.00	$100.00	$2,500.00	$201.00	$5,025.00
10	Grate Inlets	8	EA	$1,500.00	$12,000.00	$1,000.00	$8,000.00	$2,200.00	$17,600.00
11	Stairway Lights (Solar)	4	EA	$12,000.00	$48,000.00	$13,700.00	$54,800.00	$14,950.00	$59,800.00
12	Landscape & Irrigation	1	LS	$106,500.00	$106,500.00	$105,000.00	$105,000.00	$201,000.00	$201,000.00
13	Construct 4" thick Concrete Slab	83	SF	$26.50	$2,199.50	$16.00	$1,328.00	$32.00	$2,656.00
14	Construct V-Drain	55	LF	$122.00	$6,710.00	$150.00	$8,250.00	$118.00	$6,490.00
15	Remove and Dispose of Existing V-Drain	65	LF	$55.00	$3,575.00	$80.00	$5,200.00	$52.50	$3,412.50
16	Construct Retaining Wall Utility Opening	5	EA	$5,000.00	$25,000.00	$500.00	$2,500.00	$1,100.00	$5,500.00
17	Earthwork and/or Export Material	300	CY	$60.00	$18,000.00	$666.00	$199,800.00	$291.00	$87,300.00
18	Unforeseen Work	1	LS	$30,000.00	$30,000.00	$30,000.00	$30,000.00	$30,000.00	$30,000.00
19	Demobilization	1	LS	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$3,900.00	$3,900.00
	Last Minute Additions/Deductions				$0.00		$0.00		$0.00
	Total Bid Price				**$758,184.50**		**$817,692.00**		**$896,169.50**
					Multiplication error in bid item 6. Total is corrected per item unit price		Arithmetic error in total bid. Total is corrected per item unit price		



Wastewater Treatment Facility

Hillside Stabilization and Stairway Improvements Project
Site Map

Legend

- Proposed Steps
- Proposed Retaining Wall
- Buildings

CITY OF REDLANDS WASTEWATER TREATMENT PLANT
HILLSIDE STABILIZATION AND STAIRWAY IMPROVEMENT PLANS
1950 NEVADA STREET - PROJECT NO. 521038

PROFESSIONAL ENGINEER'S NOTICE TO CONTRACTOR

ALL CONTRACTORS AND SUBCONTRACTORS PERFORMING WORK SHOWN ON OR RELATED TO THESE PLANS SHALL CONDUCT THEIR OPERATIONS SO THAT ALL EMPLOYEES ARE PROVIDED A SAFE PLACE TO WORK AND THE PUBLIC IS PROTECTED. ALL CONTRACTORS AND SUBCONTRACTORS SHALL COMPLY WITH THE "OCCUPATIONAL SAFETY AND HEALTH REGULATIONS" OF THE U.S. DEPARTMENT OF LABOR AND THE STATE OF CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS "CONSTRUCTION SAFETY ORDERS." THE CIVIL ENGINEER SHALL NOT BE RESPONSIBLE IN ANY WAY FOR THE CONTRACTORS AND SUBCONTRACTORS COMPLIANCE WITH SAID REGULATIONS AND ORDERS.

CONTRACTOR FURTHER AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB-SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE CITY, THE OWNER AND THE CIVIL ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR ENGINEER.

THE EXISTENCE AND APPROXIMATE LOCATIONS OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. THE CIVIL ENGINEER ASSUMES NO LIABILITY LOCATION OF SAID LINES NOR FOR UTILITY OR IRRIGATION LINES WHOSE LOCATIONS ARE NOT SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING ALL UTILITY AND IRRIGATION COMPANIES PRIOR TO WORK OR EXCAVATION TO DETERMINE THE EXACT LOCATIONS OF ALL LINES AFFECTING THIS WORK, WHETHER OR NOT SHOWN HEREON, AND FOR ANY DAMAGE OR PROTECTION TO THESE LINES.

CONSTRUCTION NOTES & QUANTITY ESTIMATE

		QUANTITY	UNIT
1	CONSTRUCT RETAINING WALL PER DETAIL ON SHEET 3 – TYPE PER PLAN (REQUIRES SEPARATE PERMIT THROUGH BUILDING AND SAFETY)	352	LF
2	CONSTRUCT V-DITCH PER DETAIL ON SHEET 3	336	LF
3	CONSTRUCT U-CHANNEL PER DETAIL ON SHEET 3	25	LF
4	CONSTRUCT GRATE INLETS PER DETAIL ON SHEET 3	8	EA
5	CONSTRUCT CONCRETE BLOCK SLOUGH WALL PER SPPWC STD. 622-4 ON SHEET 9	178	LF
6	CONSTRUCT REINFORCED CONCRETE STAIRWAY TYPE A PER SPPWC STD. 640-4 ON SHEET 9	733	SF
7	CONSTRUCT METAL HAND RAILINGS PER SPPWC STD. 606-4	231	LF
8	INSTALL LIGHT STANDARD PER LANDSCAPE ARCHITECT'S PLAN SHEET 4 & LIGHT POLE FOOTING DETAIL ON SHEET 3	4	EA
9	CONSTRUCT 4" THICK CONCRETE SLAB W/#3 BARS @ 24"O.C.E.W. & #3 CONT. BAR AT EDGE	83	SF
10	PROTECT IN PLACE ITEM AS NOTED	1	LS
11	CONSTRUCT V-DRAIN PER DETAIL ON SHEET 3	55	LF
12	REMOVE AND DISPOSE OF EXISTING V-DRAIN	55	LF
13	CONSTRUCT RETAINING WALL UTILITY OPENING PER SPPWC STD. 617-3 ON SHEET 9	5	EA
14	REMOVE AND REPLACE EXISTING V-DRAIN AS-NEEDED TO CONSTRUCT WALL FOOTING	10	LF

NOTICE TO CONTRACTOR

THE FURNISHING OF THE ABOVE TABLE OF PROBABLE QUANTITIES DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY TO DERIVE HIS OWN ESTIMATE OF CONSTRUCTION QUANTITIES AND IS ONLY SUPPLIED AS AN AID TO THE CONTRACTOR. THE FIRM OF HICKS AND HARTWICK DOES NOT WARRANT THAT THIS IS A COMPLETE LIST OF QUANTITIES TO COMPLETE THE WORK SHOWN HEREON.

811 Know what's below. Call before you dig.
CALL 811 FOR UNDERGROUND UTILITY LOCATIONS TWO (2) WORKING DAYS PRIOR TO EXCAVATION.

GENERAL NOTES (MUNICIPAL UTILITIES & ENGINEERING DEPARTMENT)

1. ALL GRADING AND ON-SITE CONSTRUCTION SHALL MEET THE MINIMUM REQUIREMENTS OF THE CALIFORNIA BUILDING CODE, LATEST EDITION. THESE CODES ARE AMENDED IN THE CITY OF REDLANDS MUNICIPAL CODE. IF CONTRADICTIONS ARISE BETWEEN PROVISIONS IN THESE PLANS FROM THOSE IN THE VARIOUS CODES, THE MOST RESTRICTIVE PROVISION WILL GOVERN.
2. AFTER THE GRADING PERMIT HAS BEEN ISSUED, THE PROJECT MANAGER SHALL CONVENE AN ON-SITE PRE-CONSTRUCTION MEETING WITH THE CITY OF REDLANDS MUNICIPAL UTILITIES AND ENGINEERING INSPECTOR, THE ENGINEER OF RECORD, THE GEOTECHNICAL ENGINEER, AND THE GRADING CONTRACTOR. AT THIS MEETING, THE PROJECT SUPERINTENDENT SHALL BE IDENTIFIED AND AN EMERGENCY CONTACT PERSON SHALL BE IDENTIFIED TO THE MUNICIPAL UTILITIES AND ENGINEERING INSPECTOR.
3. USE BEST MANAGEMENT PRACTICES (BMP) TO PREVENT AND CONTAIN ILLEGAL DISCHARGES WITHIN THE PROJECT BOUNDARY. THIS WILL BE IN EFFECT FOR THE ENTIRE DURATION OF THE PROJECT CONSTRUCTION TO ITS COMPLETION.
4. BUILDING PERMITS SHALL NOT BE ISSUED UNTIL THE PROJECT SITE HAS BEEN GRADED AND THE ENGINEER OF RECORD HAS CERTIFIED, TO THE SATISFACTION OF THE CITY ENGINEER, THAT THE SITE HAS BEEN PREPARED ACCORDING TO THE RECOMMENDATIONS OF THE SOIL REPORT(S) AND TO THE SPECIFICATIONS OF THE APPROVED GRADING PLANS. IN ADDITION, A FINAL COMPACTION REPORT SHALL BE SUBMITTED TO BOTH THE MUNICIPAL UTILITIES AND ENGINEERING INSPECTOR AND THE BUILDING OFFICIAL FOR APPROVAL.
5. A WRITTEN REPORT BY A GEOTECHNICAL ENGINEER IS TO BE FURNISHED TO BOTH THE CITY'S MUNICIPAL MUNICIPAL UTILITIES AND ENGINEERING DEPARTMENT, AND BUILDING AND SAFETY DIVISION, TO CERTIFY THAT ALL FILL MATERIAL AND MATERIAL UPON WHICH FILL IS TO BE PLACED IS ADEQUATE TO SUPPORT THE LOADS OF THE PROPOSED DEVELOPMENT. THIS REPORT SHALL INCLUDE SOIL TEST DATA ON ALL FILLS OF TWO FEET OR MORE.
6. PREPARATION OF THE SITE SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THE INSTRUCTIONS OF A GEOTECHNICAL ENGINEER AND ALL FILLS WILL BE MADE UNDER HIS DIRECTION. THE FIRM OF HICKS & HARTWICK, INC. TAKES NO RESPONSIBILITY FOR THE SOILS ENGINEERING ON THIS PROJECT.
7. IN NO CASE IS ANY SLOPE TO EXCEED A GRADIENT OF TWO HORIZONTAL TO ONE VERTICAL (2:1).
8. THE ENGINEER OF RECORD ASSUMES NO LIABILITY FOR THE EXISTENCE AND LOCATIONS OF UNDERGROUND UTILITY LINES, STRUCTURES OR IRRIGATION LINES. THE CONTRACTOR IS TO MAKE AN ON-SITE INSPECTION AND NOTIFY ALL UTILITY AND IRRIGATION COMPANIES PRIOR TO WORK OR EXCAVATION TO DETERMINE THE EXACT LOCATION OF ANY AND ALL UNDERGROUND FACILITIES.
9. THE CONTRACTOR SHALL BE FAMILIAR WITH THE SITE AND SHALL BE RESPONSIBLE FOR CLEARING THE SITE IN PREPARATION FOR CONSTRUCTION.
10. ENGINEER'S ESTIMATE IS 350 CY OF EXCAVATION AND 50 CY OF EMBANKMENT FOR THE SITE GRADING. THESE ARE RAW QUANTITIES WITHOUT ALLOWANCES FOR LOSS, SHRINKAGE OR COMPACTION.
11. INSTALL FIRE HYDRANTS AS REQUIRED PRIOR TO THE DELIVERY OF ANY BUILDING MATERIAL TO THE SITE.
12. BENCH MARK: A SPIKE AND WASHER SET IN ASPHALT DRIVE 27'± WEST OF NORTHEASTERLY CHAIN LINK FENCE OF SITE AND 17'± NORTH OF NORTHEAST CORNER OF MOST EASTERLY SLUDGE BEDS. ELEVATION: 1174.00 FEET (NAVD 88)
13. ALL SLOPES THREE (3) FEET OR GREATER MUST BE LANDSCAPED AND IRRIGATED PRIOR TO OCCUPANCY.
14. ACREAGE OF THE PROJECT LIMITS IS: <1.0 AC. DISTURBED AREA
15. APPROVAL OF THIS PLAN DOES NOT CONSTITUTE APPROVAL FOR THE CONSTRUCTION OF ANY WALLS, SIDEWALKS, SLABS, PAVING, ETC. TO BE CONSTRUCTED ON-SITE AS SHOWN HEREON. A SEPARATE PERMIT IS REQUIRED FROM THE BUILDING AND SAFETY DIVISION FOR THE CONSTRUCTION OF THESE ON-SITE ITEMS.
16. ALL GRADING SHALL CONFORM TO THE "UPDATED GEOTECHNICAL ENGINEERING REPORT – HILLSIDE STABILIZATION/RETAINING WALL PROJECT WASTEWATER TREATMENT FACILITY" PREPARED BY CONVERSE CONSULTANTS, PROJECT NO. 24-81-275-01 DATED MARCH 12, 2025.
17. THE ENGINEER OF RECORD MUST SET GRADE STAKES FOR ALL DRAINAGE DEVICES.
18. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY INSPECTIONS PRIOR TO POURING ANY CONCRETE.
19. PROVIDE CLEAN OUTS AT ALL ANGLE POINTS IN YARD DRAINAGE PIPES.
20. RETAINING WALLS EXCEEDING THIRTY INCHES IN HEIGHT WILL REQUIRE A PROTECTIVE FENCE OR GUARDRAIL OF A LEAST THIRTY-SIX INCHES IN HEIGHT EITHER OF SOLID MATERIAL OR WITH INTERMEDIATE MEMBERS SO SPACED THAT A NINE-INCH SPHERE WILL NOT PASS THROUGH. THE COMBINATION OF A RETAINING WALL MAY NOT EXCEED NINE FEET, EXCEPT IF SUCH RETAINING WALL AND GUARDRAIL IS WITHIN FIFTEEN FEET OF AN EXISTING DWELLING, THE COMBINATION OF RETAINING WALLS AND GUARDRAILS SHALL NOT EXCEED SIX FEET IN HEIGHT.

GENERAL NOTES (BUILDING & SAFETY DEPARTMENT)

1. "GRADING SHALL MEET THE MINIMUM REQUIREMENTS OF THE APPENDIX J, CALIFORNIA BUILDING CODE 2019 EDITION. WHERE THE CODE MAY CONFLICT WITH THE PROVISIONS IN THESE PLANS OR SPECIFICATIONS, THE MORE RESTRICTIVE PROVISIONS SHALL GOVERN"
2. "ANYONE WHO IS INVOLVED WITH THE CONSTRUCTION OF THIS PROJECT SHALL COMPLY WITH ALL APPLICABLE BEST MANAGEMENT PRACTICES (BMP) TO CONTAIN OR PREVENT ANY ILLEGAL DISCHARGE OR STORM-WATER POLLUTION WITHIN THE PROJECT BOUNDARY UNTIL THE PROJECT IS COMPLETED AND ACCEPTED BY THE PUBLIC WORKS INSPECTOR OF THE CITY."
3. "RECYCLING OF CONSTRUCTION AND DEMOLITION DEBRIS IS REQUIRED AS MANDATED BY AB 939 AND SB 1066 AND AS AMENDED BY CITY OF REDLANDS ORDINANCE 2544"
4. "CONSTRUCTION ACTIVITY NOISE SHALL BE LIMITED TO THE HOURS BETWEEN 7:00 A.M. AND 6:00 P.M. MONDAY THROUGH SATURDAY. RMO 8.06.060"
5. "EVERY PERMIT ISSUED UNDER THE PROVISIONS OF THESE PLANS SHALL EXPIRE BY LIMITATION AND BECOME NULL AND VOID IF THE BUILDING OR WORK AUTHORIZED BY SUCH PERMIT IS NOT COMMENCED WITHIN 180 DAYS FROM DATE OF SUCH PERMIT, OR IF THE BUILDING OR WORK AUTHORIZED BY SUCH PERMIT IS SUSPENDED OR ABANDONED FOR A PERIOD OF 180 OR MORE DAYS AFTER WORK IS COMMENCED. BEFORE SUCH WORK CAN BE RECOMMENCED, A NEW PERMIT SHALL BE FIRST OBTAINED, AND THE FEE THERE FOR SHALL BE ONE-HALF THE AMOUNT REQUIRED FOR A NEW PERMIT FOR SUCH WORK, PROVIDING NO CHANGES HAVE BEEN MADE OR WILL BE MADE IN THE ORIGINAL PLANS AND SPECIFICATIONS FOR SUCH WORK; AND PROVIDING FURTHER THAT SUCH SUSPENSION OR ABANDONMENT HAS NOT EXCEEDED ONE YEAR. IN ORDER TO RENEW ACTION ON A PERMIT AFTER EXPIRATION, THE PERMITTEE SHALL PAY A NEW FULL PERMIT FEE". ANY PERMITTEE HOLDING AN UNEXPIRED PERMIT MAY APPLY FOR AN EXTENSION OF THE TIME WITHIN WHICH TO COMMENCE WORK UNDER THAT PERMIT FOR GOOD AND SATISFACTORY REASONS. ANY FEE IMPOSED BY THE CITY AS A CONDITION OF THE ISSUANCE OF A BUILDING PERMIT WHICH WAS ESTABLISHED OR INCREASED SUBSEQUENT TO THE ISSUANCE OF THE ORIGINAL PERMIT SHALL BE PAID IN THE AMOUNT AS REQUIRED FOR A NEW PERMIT AT THE DATE OF THE EXTENSION OF THE PERMIT. THE CHIEF BUILDING OFFICIAL MAY EXTEND THE TIME FOR COMMENCEMENT OF WORK BY THE PERMITTEE FOR A PERIOD NOT EXCEEDING 180 DAYS UPON WRITTEN REQUEST BY THE PERMITTEE PROVIDING EVIDENCE OF THE CIRCUMSTANCES BEYOND THE CONTROL OF THE PERMITTEE WHICH HAVE PREVENTED WORK FROM COMMENCING. NO PERMIT SHALL BE EXTENDED MORE THAN ONCE. IN ORDER TO RENEW ACTION ON A PERMIT AFTER EXPIRATION, THE PERMITTEE SHALL PAY A NEW FULL PERMIT FEE.
6. IT SHALL BE THE RESPONSIBILITY OF THE PERMITTEE TO SHOW EVIDENCE OF "START OF CONSTRUCTION" BY ARRANGING FOR BUILDING INSPECTIONS WITHIN 180 DAYS AFTER ISSUANCE OF PERMIT AND TO VERIFY NON-SUSPENSION OR ABANDONMENT OF WORK BY ARRANGING FOR BUILDING INSPECTIONS WHICH WILL SHOW THE WORK IS PROGRESSING WITHIN ANY 180 DAY TIME PERIOD.

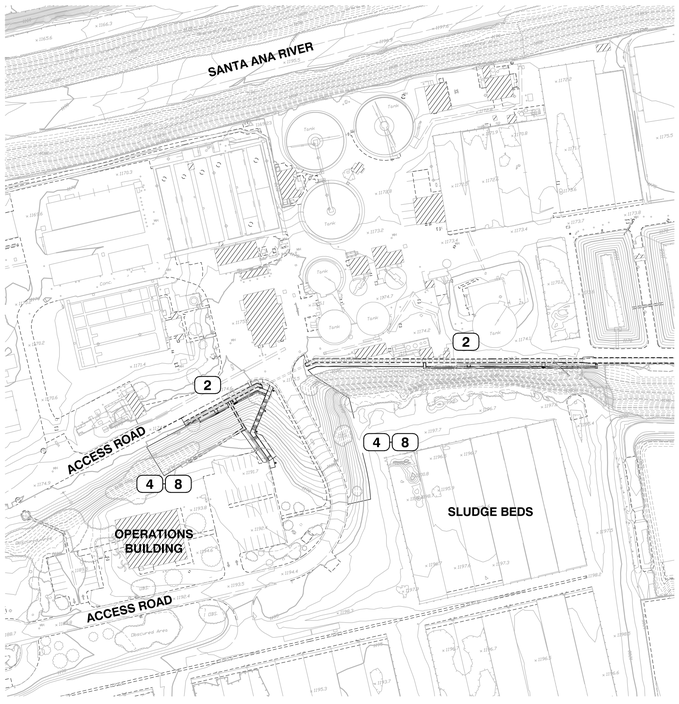
GENERAL NOTES (DEVELOPMENT SERVICES DEPARTMENT)

1. ALL DISTURBED AREAS SHALL BE REVEGETATED AS QUICKLY AS POSSIBLE.
2. ALL GRADING OPERATIONS SHALL BE SUSPENDED WHEN WIND SPEEDS (AS INSTANTANEOUS GUSTS) EXCEED 25 MPH.
3. THE CONTRACTOR SHALL SELECT EQUIPMENT BASED ON LOW EMISSION FACTORS AND HIGH ENERGY EFFICIENCY.
4. THE PROJECT CONTRACTOR SHALL PLACE ALL STATIONARY CONSTRUCTION EQUIPMENT SO THAT EMITTED NOISE IS DIRECTED AWAY FROM SENSITIVE RECEPTORS NEAREST TO THE PROJECT SITE.
5. ALL CONSTRUCTION EQUIPMENT WILL BE TUNED AND MAINTAINED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
6. THE CONTRACTOR SHALL UTILIZE ELECTRIC OR DIESEL-POWERED EQUIPMENT IN LIEU OF GASOLINE-POWERED ENGINES WHERE FEASIBLE.
7. WORK CREWS SHALL SHUT OFF EQUIPMENT WHEN NOT IN USE. DURING SMOG SEASON (MAY THROUGH OCTOBER), THE OVERALL LENGTH OF THE CONSTRUCTION PERIOD WILL BE EXTENDED, THEREBY DECREASING THE SIZE OF THE AREA PREPARED EACH DAY, TO MINIMIZE VEHICLES AND EQUIPMENT OPERATING AT THE SAME TIME.
8. THE CONSTRUCTION CONTRACTOR SHALL TIME THE CONSTRUCTION ACTIVITIES SO AS NOT TO INTERFERE WITH PEAK HOUR TRAFFIC AND TO MINIMIZE OBSTRUCTION OF THROUGH TRAFFIC LANES ADJACENT TO THE SITE; IF NECESSARY, A FLAG PERSON SHALL BE RETAINED TO MAINTAIN SAFETY ADJACENT TO EXISTING ROADWAYS.
9. THE CONSTRUCTION CONTRACTOR SHALL SUPPORT AND ENCOURAGE RIDESHARING AND TRANSIT INCENTIVES FOR THE CONSTRUCTION CREW.
10. THE CONSTRUCTION CONTRACTOR SHALL LOCATE EQUIPMENT STAGING AREAS THAT WILL CREATE THE GREATEST PRACTICAL DISTANCE BETWEEN CONSTRUCTION-RELATED NOISE SOURCES AND NOISE-SENSITIVE RECEPTORS NEAREST TO THE PROJECT SITE DURING ALL PROJECT CONSTRUCTION.
11. THE NAME AND PHONE NUMBER OF A CONTACT PERSON SHALL BE POSTED ON SITE, INFORMING THE PUBLIC WHO TO CONTACT IN THE EVENT THERE IS EXCESSIVE NOISE ON SITE.
12. ALL GRADING AND CONSTRUCTION ACTIVITIES SHALL BE LIMITED TO THE HOURS OF 7:00 A.M. TO 6:00 P.M., MONDAY THROUGH FRIDAY. GRADING AND CONSTRUCTION ACTIVITIES ARE PROHIBITED ON WEEKENDS AND FEDERAL HOLIDAYS.
13. IN THE EVENT THAT ANY SUBSURFACE ARCHEOLOGICAL MATERIALS ARE ENCOUNTERED WITHIN ANY PART OF THE PROJECT AREA, ALL GROUND-DISTURBING CONSTRUCTION ACTIVITIES MUST BE SUSPENDED IN THE VICINITY OF THE FIND UNTIL THE DEPOSIT IS RECORDED AND EVALUATED BY A QUALIFIED ARCHEOLOGIST.
14. IF HUMAN REMAINS ARE ENCOUNTERED ON THE PROPERTY ALL WORK SHALL CEASE AND THE CITY OF REDLANDS POLICE DEPARTMENT AND SAN BERNARDINO COUNTY CORONER'S OFFICE SHALL BE NOTIFIED. IF THE CORONER DETERMINES THE REMAINS TO BE OF NATIVE AMERICAN ORIGIN, HE OR SHE WILL NOTIFY THE NATIVE AMERICAN HERITAGE COMMISSION (NAHC). THE NAHC WILL THEN IDENTIFY THE MOST LIKELY DESCENDANTS TO BE CONSULTED REGARDING TREATMENT AND/OR REPATRIATION OF THE REMAINS.
15. THE CONSTRUCTION CONTRACTOR SHALL DEMONSTRATE COMPLIANCE WITH THE FUGITIVE DUST SUPPRESSION MEASURES IN SCAQMD RULE 403. SCAQMD RULE 403 REQUIRES THAT FUGITIVE DUST BE CONTROLLED SO THAT THE PRESENCE OF SUCH DUST DOES NOT REMAIN VISIBLE IN THE ATMOSPHERE BEYOND THE PROPERTY LINE OF THE EMISSION SOURCE. APPLICABLE FUGITIVE DUST CONTROL MEASURES IDENTIFIED IN RULE 403 INCLUDE THE FOLLOWING:
   - i. APPLICATION OF NONTOXIC CHEMICAL SOIL STABILIZERS ACCORDING TO MANUFACTURERS' SPECIFICATIONS TO ALL INACTIVE CONSTRUCTION AREAS (PREVIOUSLY GRADED AREAS INACTIVE FOR 10 DAYS OR MORE).
   - ii. WATER ACTIVE SITES AT LEAST TWICE DAILY. LOCATIONS WHERE GRADING IS TO OCCUR WILL BE THOROUGHLY WATERED PRIOR TO EARTHMOVING.
   - iii. COVER ALL TRUCKS HAULING DIRT, SAND, SOIL, OR OTHER LOOSE MATERIALS, OR MAINTAIN AT LEAST TWO FEET OF FREEBOARD (VERTICAL SPACE BETWEEN THE TOP OF THE LOAD AND TOP OF THE TRAILER) IN ACCORDANCE WITH THE REQUIREMENTS OF CALIFORNIA VEHICLE CODE (CVC) SECTION 23114.
   - iv. PAVE CONSTRUCTION ACCESS ROADS AT LEAST 100 FEET ONTO THE SITE FROM THE MAIN ROAD.
   - v. REDUCE TRAFFIC SPEEDS ON ALL UNPAVED ROADS TO 15 MILES PER HOUR (MPH) OR LESS.
   - vi. PERFORM DAILY STREET CLEANING AT THE CONCLUSION OF EACH WORKDAY UP TO A DISTANCE AS NECESSARY IN EITHER DIRECTION OF ANY ACCESS POINTS.
   - vii. WASH OFF TRUCKS LEAVING THE SITE AND WET DOWN OR TARP ANY TRUCKS HAULING DIRT AWAY FROM THE SITE.
   - viii. DOUBLE SANDBAG ALL SITE PERIMETERS ADJOINING TRAVELED ROADS FROM NOVEMBER TO APRIL TO PREVENT DIRT FROM WASHING OFF THE SITE DURING THE RAINY SEASON.
   - ix. ESTABLISH LANDSCAPING WITHIN 90-DAYS OF THE COMPLETION OF GRADING, OR HYDROSEED WITH A NATIVE PLANT MIX AS AN INTERIM GROUNDCOVER TO MINIMIZE WIND EROSION AND IRRIGATE AS NECESSARY TO SUSTAIN GROUNDCOVER.

BASIS OF BEARINGS

BEARINGS ARE BASED ON THE BEARING BETWEEN CONTINUOUSLY OPERATING REFERENCE STATIONS PID DN7586 AND PID DN7454 BEING N89°32'10"W

INDEX MAP



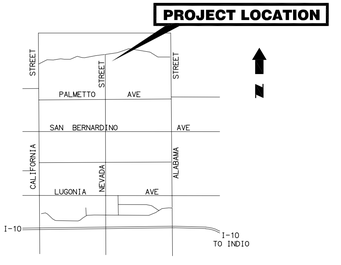
1" = 100'

SHEET INDEX

#	INDICATES SHEET NUMBER
1	TITLE SHEET
2	PRECISE GRADING PLAN
3	DETAIL SHEET
4	IRRIGATION PLAN
5	IRRIGATION DETAILS
6	PLANTING PLAN
7	IRRIGATION SPECIFICATIONS
8	PLANTING SPECIFICATIONS
9	DETAIL SHEET

VICINITY MAP

NOT TO SCALE



LEGEND

-----(SCE)-----	EXISTING ELECTRIC
-----(T)-----	EXISTING TELEPHONE
-----(W)-----	EXISTING WATERLINE (SIZE AS SHOWN)
-----(FW)-----	EXISTING FIRE WATER (SIZE AS SHOWN)
-----(TWC)-----	EXISTING TIME WARNER CABLE
-----(S)-----	EXISTING SEWER (SIZE AS SHOWN)
-----(G)-----	EXISTING GAS (SIZE AS SHOWN)
-----(SD)-----	EXISTING STORM DRAIN (SIZE AS SHOWN)
	PROPOSED WALL

ABBREVIATIONS

AC	ASPHALT PAVEMENT	HP	HIGH POINT
APN	ASSESSOR'S PARCEL NUMBER	INV	INVERT
BLDG	BUILDING	LP	LOW POINT
℄	CENTERLINE	L/S	LANDSCAPE
CLF	CHAIN LINK FENCE	MH	MANHOLE
CONC	CONCRETE	MIN	MINIMUM
DDC	DOUBLE CHECK DETECTOR	MAX	MAXIMUM
DIA	DIAMETER	PIV	POST INDICATOR VALVE
EG	EXISTING GRADE	ℙ	PROPERTY LINE
FF	FINISHED FLOOR	PROP	PROPOSED
FDHC	FIRE DEPARTMENT HOSE CONNECTION	PP	POWER POLE
FH	FIRE HYDRANT	TC	TOP OF CURB
FL	FLOW LINE	TW	TOP OF WALL
FG	FINISH GRADE	TYP	TYPICAL
FS	FINISHED SURFACE	WAT	WATER
FW	FIRE WATER	WV	WATER VALVE
GB	GRADE BREAK	W/	WITH
GP	GUARD POST	XING	CROSSING

BENCHMARK

THE BENCHMARK FOR THIS SURVEY IS A SPIKE AND WASHER SET IN ASPHALT DRIVE 27'± WEST OF NORTHEASTERLY CHAIN LINK FENCE OF SITE AND 17'± NORTH OF NORTHEAST CORNER OF MOST EASTERLY SLUDGE BEDS.

ELEVATION: 1174.00 FEET (NAVD 88)

Letter	Description	Date	Initial	Initial
1	ADD SHEET 9, REVISE SHEET NUMBERING, CONSTRUCTION NOTES AND QUANTITIES.			

Revisions

R.C.E. No. 63494 Date 7/18/2025

REGISTERED PROFESSIONAL ENGINEER MATTHEW C. HICKS No. 63494 CIVIL STATE OF CALIFORNIA

Hicks & Hartwick, Inc.
37 East Olive Ave. Ste C
Redlands, CA. 92373
909.793.2257
CITY BUSINESS TAX # 0385500
EXPIRES: 12/31/2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

WASTEWATER TREATMENT PLANT
HILLSIDE STABILIZATION & STAIRWAY IMPROVEMENT PLANS

TITLE SHEET

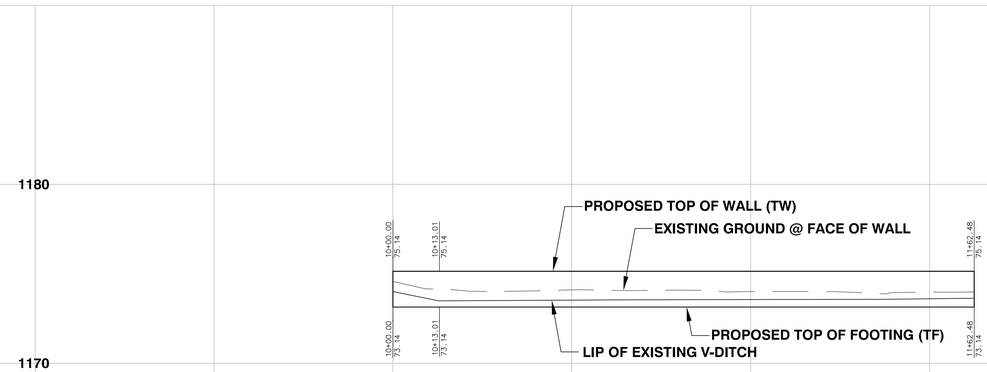
Checked by: _____ Date: _____
Checked by: _____ Date: _____
Checked by: _____ Date: _____
Checked by: _____ Date: _____

REVIEWED BY: _____ DATE 7/18/2025
Gerard J. Nepomuceno, Civil Engineer RCE #93200
APPROVED BY: _____ DATE 7/18/2025
Goutam K. Dobey, City Engineer RCE #75646

SHEET 1 OF 9 SHEETS

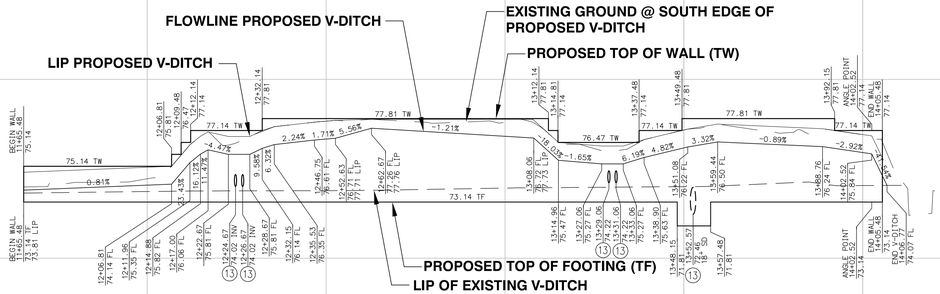
2475-PG-01/09

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RETAINING WALL 'B'

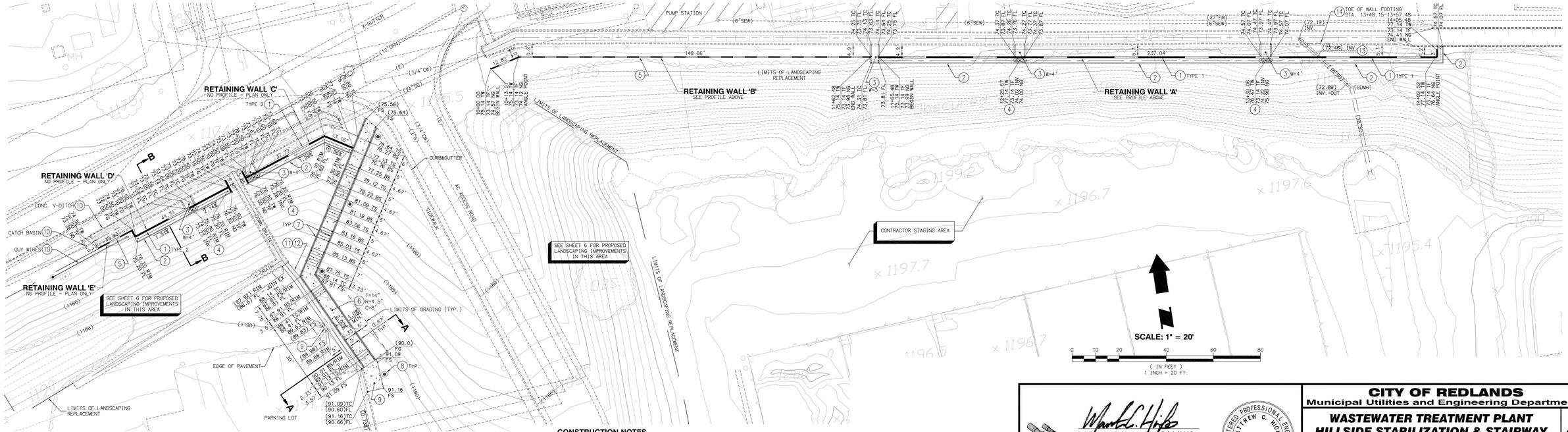
SLOUGH WALL
SEE PLAN VIEW BELOW



RETAINING WALL 'A'

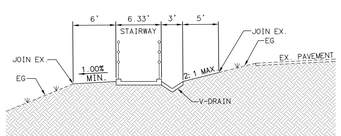
WALL TYPE 1
SEE PLAN VIEW BELOW

PROFILE SCALE:
HORIZONTAL: 1" = 20'
VERTICAL: 1" = 4'



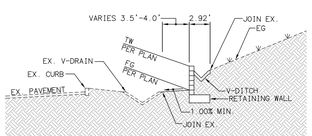
SECTION A-A

NOT TO SCALE



SECTION B-B

NOT TO SCALE



CONSTRUCTION NOTES

1. CONSTRUCT RETAINING WALL PER DETAIL ON SHEET 3 – TYPE PER PLAN (REQUIRES SEPARATE PERMIT THROUGH BUILDING AND SAFETY)
2. CONSTRUCT V-DITCH PER DETAIL ON SHEET 3
3. CONSTRUCT U-CHANNEL PER DETAIL ON SHEET 3
4. CONSTRUCT GRATE INLETS PER DETAIL ON SHEET 3
5. CONSTRUCT CONCRETE BLOCK SLOUGH WALL PER SPPWC STD. 622-4 ON SHEET 9
6. CONSTRUCT REINFORCED CONCRETE STAIRWAY TYPE A PER SPPWC STD. 640-4 ON SHEET 9
7. CONSTRUCT METAL HAND RAILINGS PER SPPWC STD. 606-4
8. INSTALL LIGHT STANDARD PER LANDSCAPE ARCHITECT'S PLAN SHEET 4 & LIGHT POLE FOOTING DETAIL ON SHEET 3
9. CONSTRUCT 4" THICK CONCRETE SLAB W/#3 BARS @ 24"O.C.E.W. & #3 CONT. BAR AT EDGE
10. PROTECT IN PLACE ITEM AS NOTED
11. CONSTRUCT V-DRAIN PER DETAIL ON SHEET 3
12. REMOVE AND DISPOSE OF EXISTING V-DRAIN
13. CONSTRUCT RETAINING WALL UTILITY OPENING PER SPPWC STD. 617-3 ON SHEET 9
14. REMOVE AND REPLACE EXISTING V-DRAIN AS-NEEDED TO CONSTRUCT WALL FOOTING

Hicks & Hartwick, Inc.
37 East Olive Ave, Ste C
Redlands, CA. 92373
909.793.2257

R.C.E. No. 63494 Date: 7/18/2025

REGISTERED PROFESSIONAL ENGINEER MATTHEW C. HICKS No. 63494 CIVIL STATE OF CALIFORNIA

CITY BUSINESS TAX # 0385500
EXPIRES: 12/31/2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

WASTEWATER TREATMENT PLANT HILLSIDE STABILIZATION & STAIRWAY IMPROVEMENT PLANS

PRECISE GRADING

BENCHMARK

THE BENCHMARK FOR THIS SURVEY IS A SPIKE AND WASHER SET IN ASPHALT DRIVE 27'± WEST OF NORTHEASTERLY CHAIN LINK FENCE OF SITE AND 17'± NORTH OF NORTHEAST CORNER OF MOST EASTERLY SLUDGE BEDS.

ELEVATION: 1174.00 FEET (NAVD 88)

Letter	Description	Date	Initial	Initial
1	REVISE SHEET NUMBERING AND CONSTRUCTION NOTES.			

Revisions

Checked by: ____ Date: ____
Checked by: ____ Date: ____
Checked by: ____ Date: ____
Checked by: ____ Date: ____

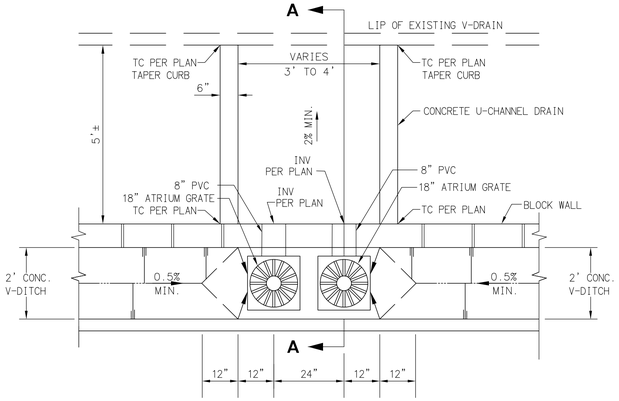
REVIEWED BY: DATE 7/18/2025
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APPROVED BY: DATE 7/18/2025
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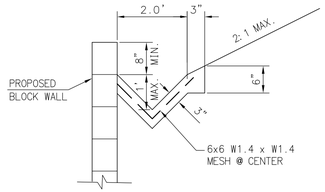
⚠ SHEET 2 OF 9 SHEETS

2475-PG-02/09

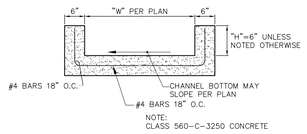
\\T1\acadata_10000_\10383 Redlands On-Call_WWTP Slope\In_GRADE\ 10383GM02_GRADING.dwg 1:31pm – Aug 12, 2025



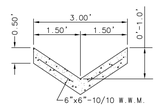
4 **TYPICAL INLET DETAIL**
NOT TO SCALE



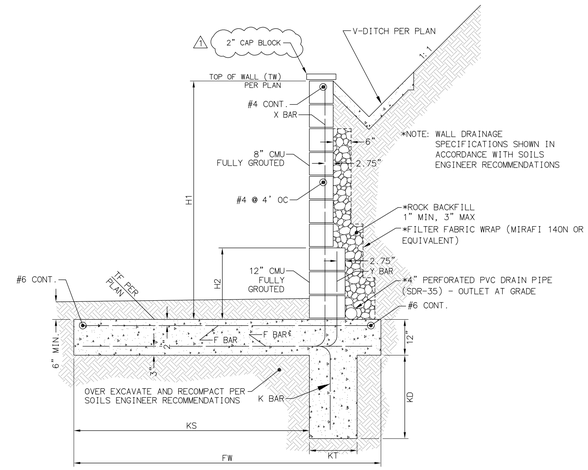
2 **V-DITCH**
NOT TO SCALE



3 **"U"-CHANNEL**
NOT TO SCALE



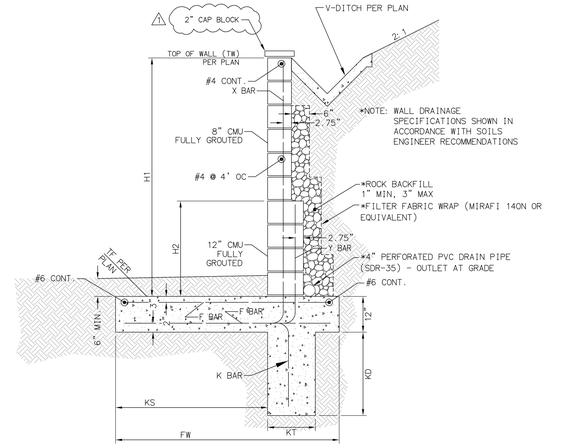
11 **V-DRAIN DETAIL**
NOT TO SCALE



TYPE 1 WALL
TYPICAL WALL SECTION
SCALE: 1" = 2'

NOTE: OMIT HEAD JOINT AT FIRST EXPOSED COURSE

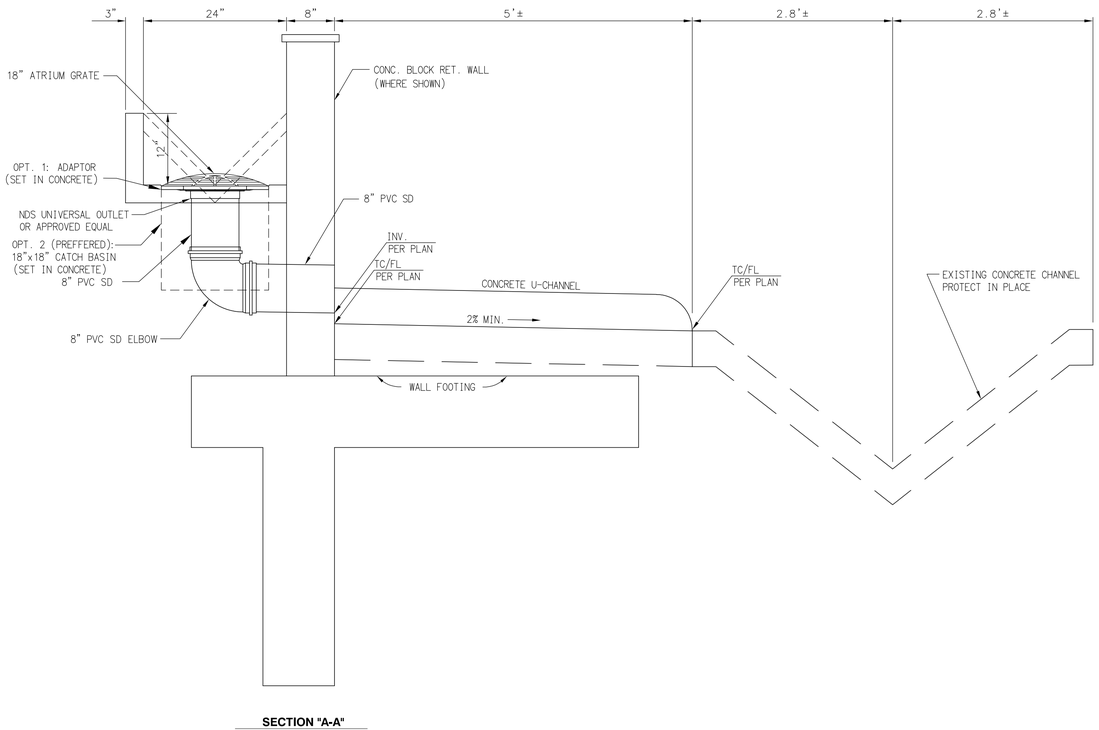
H1	H2	X BARS	Y BARS	F BARS	K BARS	FW	KD	KT	KS
6' 0"	2' 0"	#6 @ 8"	#6 @ 8"	#6 @ 6"	#6 @ 6"	8' 7"	4' 11"	16"	6' 7"
5' 4"	1' 4"	#6 @ 8"	#6 @ 8"	#6 @ 6"	#6 @ 6"	7' 5"	4' 5"	12"	5' 5"
4' 8"	0' 8"	#6 @ 8"	#6 @ 16"	#6 @ 12"	#6 @ 6"	6' 9"	3' 10"	12"	4' 9"
4' 0"	---	#6 @ 8"	---	#6 @ 12"	#6 @ 12"	6' 3"	3' 4"	12"	4' 3"
3' 4"	---	#6 @ 24"	---	#6 @ 12"	#6 @ 12"	4' 9"	2' 4"	8"	3' 5"
2' 8"	---	#6 @ 48"	---	#6 @ 18"	#6 @ 18"	3' 11"	1' 10"	8"	2' 7"
2' 0"	---	#6 @ 48"	---	#6 @ 18"	#6 @ 18"	3' 3"	1' 3"	8"	1' 11"



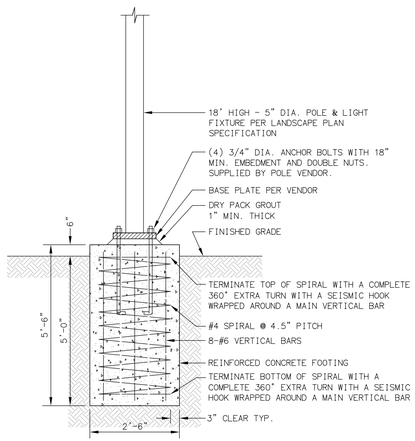
TYPE 2 WALL
TYPICAL WALL SECTION
SCALE: 1" = 2'

NOTE: OMIT HEAD JOINT AT FIRST EXPOSED COURSE

H1	H2	X BARS	Y BARS	F BARS	K BARS	FW	KD	KT	KS
6' 0"	2' 8"	#6 @ 8"	#6 @ 8"	#6 @ 6"	#6 @ 6"	7' 6"	4' 9"	16"	5' 6"
5' 4"	1' 4"	#6 @ 8"	#6 @ 8"	#6 @ 12"	#6 @ 8"	7' 1"	4' 2"	12"	5' 1"
4' 8"	0' 8"	#6 @ 8"	#6 @ 16"	#6 @ 12"	#6 @ 12"	6' 1"	3' 7"	12"	4' 1"
4' 0"	---	#6 @ 8"	---	#6 @ 18"	#6 @ 18"	5' 4"	3' 1"	12"	3' 4"
3' 4"	---	#6 @ 24"	---	#6 @ 18"	#6 @ 18"	4' 9"	2' 3"	8"	3' 5"
2' 8"	---	#6 @ 40"	---	#6 @ 18"	#6 @ 18"	3' 10"	1' 8"	8"	2' 6"
2' 0"	---	#6 @ 48"	---	#6 @ 18"	#6 @ 18"	3' 1"	1' 1"	8"	1' 9"



SECTION "A-A"
NOT TO SCALE



1 8 **LIGHT POLE FOOTING**
NOT TO SCALE

CONSTRUCTION NOTES

1. CONSTRUCT RETAINING WALL PER DETAIL ON SHEET 3 – TYPE PER PLAN (REQUIRES SEPARATE PERMIT THROUGH BUILDING AND SAFETY)
2. CONSTRUCT V-DITCH PER DETAIL ON SHEET 3
3. CONSTRUCT U-CHANNEL PER DETAIL ON SHEET 3
4. CONSTRUCT GRATE INLETS PER DETAIL ON SHEET 3
5. CONSTRUCT CONCRETE BLOCK SLOUGH WALL PER SPPWC STD. 622-4 ON SHEET 9
6. CONSTRUCT REINFORCED CONCRETE STAIRWAY TYPE A PER SPPWC STD. 640-4 ON SHEET 9
7. CONSTRUCT METAL HAND RAILINGS PER SPPWC STD. 606-4
8. INSTALL LIGHT STANDARD PER LANDSCAPE ARCHITECT'S PLAN SHEET 4 & LIGHT POLE FOOTING DETAIL ON SHEET 3
9. CONSTRUCT 4" THICK CONCRETE SLAB W/#3 BARS @ 24"O.C.E.W. & #3 CONT. BAR AT EDGE
10. PROTECT IN PLACE ITEM AS NOTED
11. CONSTRUCT V-DRAIN PER DETAIL ON SHEET 3
12. REMOVE AND DISPOSE OF EXISTING V-DRAIN
13. CONSTRUCT RETAINING WALL UTILITY OPENING PER SPPWC STD. 617-3 ON SHEET 9
14. REMOVE AND REPLACE EXISTING V-DRAIN AS-NEEDED TO CONSTRUCT WALL FOOTING

BENCHMARK

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ELEVATION: 1174.00 FEET (NAVD 88)

Letter	Description	Date	Initial	Initial
1	REVISE SHEET NUMBERING AND CONSTRUCTION NOTES. ADDED LIGHT POLE FOOTING DETAIL. REVISED WALL CAP			

Revisions

R.C.E. No. 63494 Date: 7/18/2025

REGISTERED PROFESSIONAL ENGINEER
MATTHEW C. HICKS
No. 63494
CIVIL
STATE OF CALIFORNIA

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CITY BUSINESS TAX # 0385500
EXPIRES: 12/31/2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

WASTEWATER TREATMENT PLANT
HILLSIDE STABILIZATION & STAIRWAY
IMPROVEMENT PLANS

DETAIL SHEET

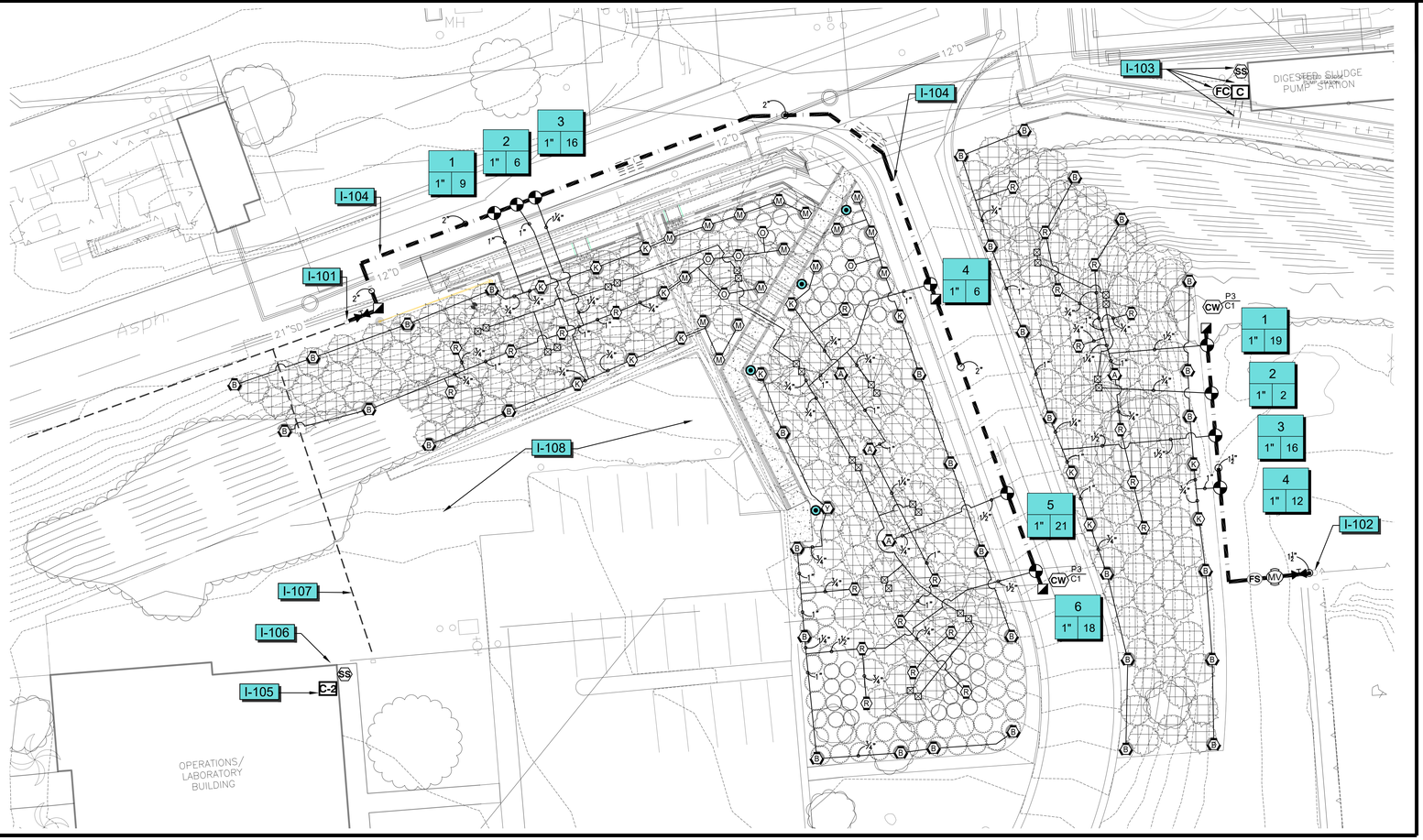
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REVIEWED BY: DATE 7/18/2025
Gerard J. Nepomuceno, Civil Engineer RCE #93200
APPROVED BY: DATE 7/18/2025
Gautam K. Dobey, City Engineer RCE #75646

SHEET 3 OF 9 SHEETS

2475-PG-03/09

\\T1\vcadata_10000_\10383 Redlands On-Call_WWTP Slope\h_GRADE\ 10383GM03_DETAILS.dwg 2:27pm – Aug 12, 2025



IRRIGATION NOTES

REFER TO SPECIFICATIONS ON SHEET LIS-1 FOR FULL IRRIGATION SPECIFICATIONS.

ALL WORK SHALL BE IN ACCORDANCE WITH LOCAL CODES AND SPECIFICATIONS AND BE OF THE HIGHEST QUALITY TYPICAL OF THE TRADE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL REQUIRED PERMITS AND PAY FOR SAME.

THE CONTRACTOR SHALL CARRY ALL WORKERS COMPENSATION, PUBLIC LIABILITY AND PROPERTY DAMAGE INSURANCE AS REQUIRED BY THE STATE, CITY OR OWNER.

IF THE PLANS OR SPECIFICATIONS IN THESE DRAWINGS ARE FELT IN ANY WAY TO BE INCOMPLETE, MISDIRECTING, CONFLICTING OR SUBJECT TO MISINTERPRETATION, IT IS THE CONTRACTOR'S RESPONSIBILITY TO BRING THESE CONCERNS TO THE LANDSCAPE ARCHITECT'S ATTENTION BEFORE BIDDING. IF THE CONTRACTOR FAILS TO DO SO, THEY MUST ACCEPT THE LANDSCAPE ARCHITECT'S INTERPRETATION AND ASSUME ANY POSSIBLE RELATED FINANCIAL IMPACT.

THE CONTRACTOR SHALL PROVIDE PHOTOS AND SIGNED DOCUMENTED PROOF OF P.S.I. TESTING SHOWING AVAILABLE STATIC PRESSURE AT THE P.O.C. OR IRRIGATION METER PER PLAN PRIOR TO COMMENCING IRRIGATION INSTALLATION. FAILURE TO PROVIDE EXISTING STATIC PRESSURE TESTING WILL ABSOLVE STB LANDSCAPE ARCHITECT'S INC. FROM ANY IRRIGATION SYSTEM MALFUNCTION DUE TO TOO HIGH OR TOO LOW STATIC PRESSURE.

THE CONTRACTOR SHALL AT ALL TIMES PROTECT HIS WORK FROM DAMAGE AND THEFT AND REPLACE ALL DAMAGED OR STOLEN PARTS AT HIS EXPENSES UNTIL THE INSTALLATION IS ACCEPTED BY THE OWNER IN WRITING.

VERIFY ALL CONDITIONS AND DIMENSIONS PRIOR TO COMMENCING ANY WORK, NOTIFY THE LANDSCAPE ARCHITECT IMMEDIATELY IF ANY DISCREPANCY IS FOUND. CONTRACTOR SHALL THOROUGHLY FAMILIARIZE HIMSELF WITH ALL SITE CONDITIONS PRIOR TO BIDDING OR COMMENCING WORK.

EXTREME CARE SHALL BE EXERCISED WHEN WORKING ADJACENT TO ANY STRUCTURES OR UTILITIES. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL EXISTING UTILITIES AND REPAIRING ANY DAMAGES CAUSED BY HIS WORK AT NO COST TO THE OWNER.

IRRIGATION DESIGN IS BASED ON AN AVAILABLE MINIMUM WATER PRESSURE OF 55 P.S.I. WITH A MAXIMUM SYSTEM DEMAND OF 21 G.P.M. CONTRACTOR SHALL VERIFY STATIC PRESSURE AVAILABLE AT THE IRRIGATION POC PRIOR TO COMMENCING WORK. CONTRACTOR MUST PROVIDE SIGNED DOCUMENTED PROOF TO THE LANDSCAPE ARCHITECT AND OWNER OF THE STATIC P.S.I. PRIOR TO COMMENCING WORK. PSI INFORMATION WAS OBTAINED FROM THE ON-SITE CITY REPRESENTATIVE.

THE LANDSCAPE ARCHITECT SHALL BE RESPONSIBLE FOR THE INTERPRETATION OF THE DRAWINGS SHOULD A QUESTION ARISE.

PROVIDE CHECK VALVES AS NEEDED TO ELIMINATE ALL LOW HEAD DRAINAGE. INSTALL IN-LINE CHECK/ANTI-DRAIN VALVES WHENEVER AN ELEVATION DIFFERENCE BETWEEN INLETS/OUTLETS EXCEEDS 4' OF VERTICAL HEIGHT.

ALL EQUIPMENT SHALL BE AS LISTED IN THE LEGEND. SUBSTITUTIONS WILL NOT BE PERMITTED WITHOUT PRIOR APPROVAL OF THE LANDSCAPE ARCHITECT.

ALL EQUIPMENT SHALL BE INSTALLED PER DETAILS, IN THE ABSENCE OF DETAILS, INSTALLATION SHALL BE IN ACCORDANCE WITH THE STANDARD PRACTICE OF THE TRADE.

DESIGN INTENT IS TO PROVIDE COMPLETE IRRIGATION COVERAGE TO ALL PLANTED AREAS, AS FIELD CHANGES MAY OCCUR, CONTRACTOR IS REQUIRED TO PROVIDE 100% COVERAGE TO ALL AREAS. CONTRACTOR SHALL NOT KNOWINGLY INSTALL AN IRRIGATION SYSTEM WITH IMPROPER COVERAGE, FAILURE TO NOTIFY THE LANDSCAPE ARCHITECT SHALL RESULT IN THE CONTRACTOR REPAIRING/REPLACING SAID SYSTEM AT HIS OR HER EXPENSE.

BEFORE BEGINNING CONSTRUCTION, THE CONTRACTOR MUST OBTAIN ALL NECESSARY PERMITS FROM THE CITY.

INSTALL ALL COMPONENTS PER CURRENT U.P.C. AND LOCAL CODES.

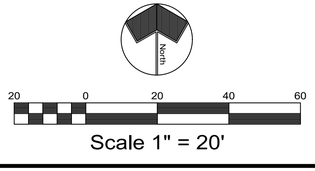
CONTRACTOR SHALL MAINTAIN A CLEAN AND SAFE WORKING ENVIRONMENT. DAY AND NIGHT BARRICADES MUST BE PROVIDED FOR ALL OPEN TRENCHES.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE UNDERGROUND SERVICE ALERT AT 811 AT LEAST 48 HOURS PRIOR TO TRENCHING FOR EXACT UNDERGROUND UTILITY LOCATIONS. THE CONTRACTOR ASSUMES ALL RESPONSIBILITY FOR THE REPAIR OR REPLACEMENT OF UNDERGROUND UTILITIES OR STRUCTURES WHICH ARE DAMAGED DURING THE COURSE OF COMPLETING THIS WORK.

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE
811
TWO WORKING DAYS BEFORE YOU DIG

IRRIGATION SCHEDULE

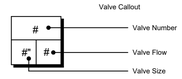
CODE	DESCRIPTION
I-101	POC (1) AT EXISTING 2" RECYCLED WATER MAINLINE BALL VALVE. ADJUST EXISTING VALVE BOX TO GRADE AFTER CONNECTION.
I-102	POC (2) AT EXISTING 1-1/2" RECYCLED WATER LINE. MAKE CONNECTION BELOW GRADE.
I-103	NEW IRRIGATION CONTROLLER, SOLAR SYNC AND FLOW CLIK. LOCATE AND SECURE CONTROLLER ON OUTSIDE OF WALL. LOCATE SOLAR SYNC ON EAVE OF ROOF STRUCTURE. VERIFY LOCATIONS WITH CITY REPRESENTATIVE PRIOR TO INSTALLATION. POWER TO CONTROLLER TO BE SUPPLIED BY CITY. INSTALL ELECTRICAL CONDUIT FOR CONTROL WIRES FROM CONTROLLER TO SLOPE, MINIMUM CONDUIT SIZE 1"
I-104	SOME IRRIGATION EQUIPMENT AND PIPING SHOWN IN HARDSCAPE, IN BUILDING FOOTPRINT OR OUTSIDE OF PROPERTY FOR GRAPHIC CLARITY. ALL EQUIPMENT AND PIPING TO BE INSIDE PROPERTY AND IN LANDSCAPE AREAS EXCEPT WHERE PIPING IS INSTALLED UNDER HARDSCAPES. TYPICAL
I-105	REPLACE EXISTING CONTROLLER WITH NEW HUNTER CONTROLLER PER LEGEND. RECONNECT EXISTING CONTROL WIRES AND NEW CONTROL WIRES. PROGRAM NEW CONTROLLER AS NEEDED. COORDINATE WITH CITY REPRESENTATIVE. REMOVE EXISTING RAIN SENSOR AND REPLACE WITH HUNTER SOLAR SYNC. RETURN EXISTING CONTROLLER TO CITY REPRESENTATIVE.
I-106	TRENCH FOR NEW CONTROL WIRES. CONTRACTOR TO TAKE PRECAUTIONS TO AVOID DAMAGE TO ANY EXISTING IRRIGATION, LANDSCAPE OR UTILITIES. ANY DAMAGE TO ANY SHALL BE REPAIRED OR REPLACED TO A LIKE NEW CONDITION AT NO ADDITIONAL COST TO THE OWNER.
I-107	EXISTING IRRIGATION MAINLINE-PROTECT IN PLACE
I-108	EXISTING IRRIGATION-PROTECT IN PLACE



IRRIGATION SCHEDULE

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	PSI	DETAIL
M L O	HUNTER MP1000 PROS-00-PRS40 SHRUB ROTATOR, FIXED-RISER, PRESSURE REGULATED TO 40 PSI, MP ROTATOR NOZZLE. M=MAROON ADJ ARC 90 TO 210, L=LIGHT BLUE 210 TO 270 ARC, O=OLIVE 360 ARC.	40	A, LID-1
K G R	HUNTER MP2000 PROS-00-PRS40 SHRUB ROTATOR, FIXED-RISER, PRESSURE REGULATED TO 40 PSI, MP ROTATOR NOZZLE. K=BLACK ADJ ARC 90-210, G=GREEN ADJ ARC 210-270, R=RED 360 ARC.	40	A, LID-1
B Y A	HUNTER MP3000 PROS-00-PRS40 SHRUB ROTATOR, FIXED-RISER, PRESSURE REGULATED TO 40 PSI, MP ROTATOR NOZZLE. B=BLUE ADJ ARC 90-210, Y=YELLOW ADJ ARC 210-270, A=GRAY 360 ARC.	40	A, LID-1
25Q	HUNTER PROS-PRS30-00-MSBN MULTI-STREAM BUBBLER, FIXED RISER, 25=.25GPM,	30	B, LID-1
SYMBOL	MANUFACTURER/MODEL/DESCRIPTION		DETAIL
	RAIN BIRD PESBR 1IN., DURABLE CHLORINE-RESISTANT VALVES FOR RECLAIMED WATER APPLICATIONS. WITH SCRUBBER MECHANISM TECHNOLOGY, AND PURPLE FLOW CONTROL HANDLE.		C, LID-1
	HUNTER HQ-44RC-AW QUICK COUPLER VALVE, YELLOW RUBBER COVER, RED BRASS AND STAINLESS STEEL, WITH 1IN. NPT INLET, 2-PIECE BODY. ACME KEY WITH ANTI-ROTATION WINGS.		D, LID-1
	LANDSCAPE PRODUCTS INC. BBV LINE SIZE, FULL PORT BRASS BALL VALVE.		E, LID-1
MV	SUPERIOR 3200 1" NORMALLY CLOSED BRASS MASTER VALVE THAT PROVIDES DIRTY WATER PROTECTION AND NO MINIMUM FLOW FEATURE, WHICH ENSURES RELIABLE OPENING AND CLOSING OF THE VALVE IN EXTREME HIGH OR LOW FLOW SCENARIOS. .		F, LID-1
C-2	HUNTER P2C-400 WITH (03) PCM-300 LIGHT COMMERCIAL & RESIDENTIAL CONTROLLER, 13-STATION EXPANDED MODULE CONTROLLER, 120 VAC, OUTDOOR/INDOOR MODEL		G, LID-1
C	HUNTER P2C-400-PC-DM LIGHT COMMERCIAL & RESIDENTIAL CONTROLLER, 4-STATION BASE MODULE CONTROLLER, 120 VAC, OUTDOOR/INDOOR, PC-DM.		G, LID-1
SS	HUNTER WSS-SEN WIRELESS SOLAR, RAIN FREEZE SENSOR WITH OUTDOOR INTERFACE, CONNECTS TO HUNTER X-CORE AND ACC CONTROLLERS, INSTALL AS NOTED. INCLUDES GUTTER MOUNT BRACKET. MODULE NOT INCLUDED.		G, LID-1
FC	HUNTER FLOW-CLIK-150 FLOW SENSOR SOV WITH INTERFACE PANEL, 1-1/2IN. SCHEDULE 40 SENSOR BODY, 24 VAC, 2 AMP, INSTALL INTERFACE PANEL AS REQUIRED.		G, LID-1
FS	HUNTER HFS-150 FLOW SENSOR FOR USE WITH ACC CONTROLLER, 1-1/2IN. SCHEDULE 40 SENSOR BODY, 24 VAC, 2 AMP.		F, LID-1
CW PX CX	WIRE BUNDLE (AS INDICATED FOR FUTURE USE) SPARE CONTROL WIRE BUNDLE FOR FUTURE USE IN JUNCTION BOX. P=PILOT WIRES, C=COMMON WIRES BUNDLED. COIL WIRES IN VALVE BOX, AND RUN CONTINUOUS WIRE BACK TO CONTROLLER. LABEL EACH WIRE WITH A PLASTIC I.D. TAG AT THE WIRE BUNDLE AND AT THE CONTROLLER.		
	IRRIGATION LATERAL LINE: UVR BROWNLINE PVC SCHEDULE 40-NP, MIN 3/4"		H, LID-1
	IRRIGATION MAINLINE: PVC SCHEDULE 40 AND 315-NP, SIZE PER PLAN, 2"=CL 315		H, LID-1
	PIPE SLEEVE: PVC SCHEDULE 40		H, LID-1

Valve Callout



PLANTING INSPECTION NOTE TO CONTRACTOR:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE CITY, THE LANDSCAPE ARCHITECT AND THE OWNER, AS NECESSARY, TO FACILITATE ALL PLANTING INSPECTIONS REQUIRED THAT RELATE TO OBTAINING CERTIFICATIONS OF COMPLETION.

REFER TO SHEET 5 FOR IRRIGATION DETAILS
REFER TO SHEET 7 FOR IRRIGATION SPECIFICATIONS

BENCHMARK

THE BENCHMARK FOR THIS SURVEY IS A SPIKE AND WASHER SET IN ASPHALT DRIVE 27'± WEST OF NORTHEASTERLY CHAIN LINK FENCE OF SITE AND 17'± NORTH OF NORTHEAST CORNER OF MOST EASTERLY SLUDGE BEDS.

ELEVATION: 1174.00 FEET (NAVD 88)

Letter	Description	Date	Initial	Initial
1	REVISE SHEET NUMBERING: 8/11/25			

Revisions

LANDSCAPE ARCHITECTS, INC
15 SOUTH 5TH STREET
REDLANDS, CALIFORNIA 92373
PH 909.798.7490 FAX 909.307.8235
CA LIC. NO. 2725 NV LIC. NO. 466
LANDSCAPE ARCHITECTURE IRRIGATION CONSULTANTS WATER FEATURE DESIGNS
LOW VOLTAGE LIGHTING

REGISTERED LANDSCAPE ARCHITECT SHAWN T. BURCH exp. date 10/26 signature 7/21/25 date 2725 STATE OF CALIFORNIA

CITY OF REDLANDS
Municipal Utilities and Engineering Department

WASTE WATER TREATMENT PLANT HILLSIDE STABILIZATION & STAIRWAY IMPROVEMENT PLANS

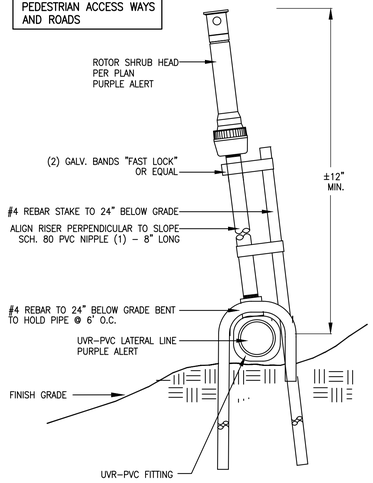
IRRIGATION PLAN

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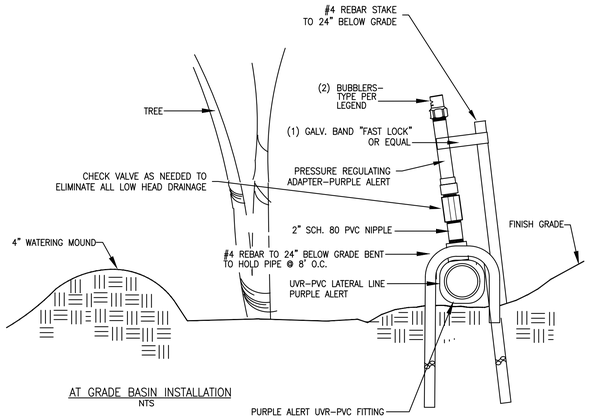
REVIEWED BY: Gerard J. Nepomuceno, Civil Engineer RCE #93200 DATE 7/18/2025
APPROVED BY: Goutam K. Dowey, City Engineer RCE #75648 DATE 7/18/2025

SHEET 4 OF 9 SHEETS

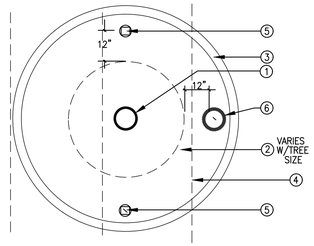
2475-PG/04/09



A FIXED RISER ROTATOR



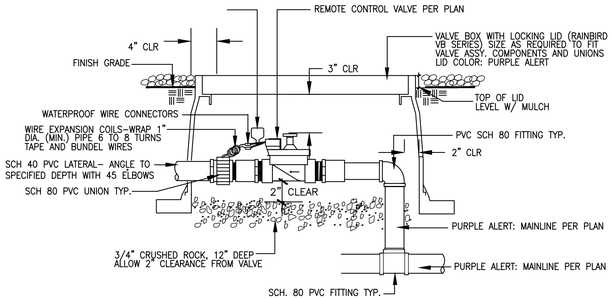
AT GRADE BASIN INSTALLATION
NTS



PLAN VIEW (BOTH)
NTS

1. TREE PER PLAN
2. ROOT BALL
3. WATERING BASIN
4. CONTOURS
5. INSTALL BUBBLER 12" FROM ROOTBALL
6. 4" DIA. x 30" L SCH 40 PERFORATED PIPE INSTALL 12" FROM ROOT BALL

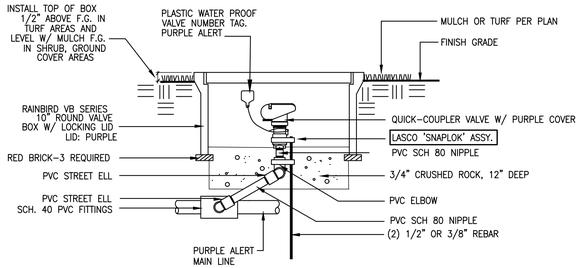
B TREE BUBBLER



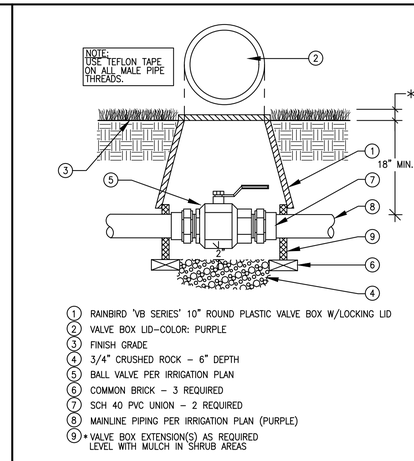
NOTES: UNLESS OTHERWISE SPECIFIED.

1. REFER TO SYSTEM SPECIFICATIONS/PLAN LEGEND FOR APPROVED PRODUCTS.
2. USE 1–1/2 WRAPS OF 3/4" WIDE TEFLON TAPE OR A NON–PETROLEUM BASE NON HARDENING THREAD SEALANT ON ALL THREADS. WIPE OFF ALL EXCESS THREAD SEALANT WITH A CLEAN CLOTH.
3. ALL THREADED FITTINGS AND NIPPLES TO BE THE SAME LINE SIZE AS R.C.V.
4. INSTALL ONLY ONE RCV PER VALVE BOX. TOP OF FLOW STEMS TO CLEAR LID BY 3".
5. COMPACT SOIL AROUND VALVE BOX TO 90% DENSITY.
6. VALVE BOX TO HAVE LOCKING LID.

C REMOTE CONTROL VALVE

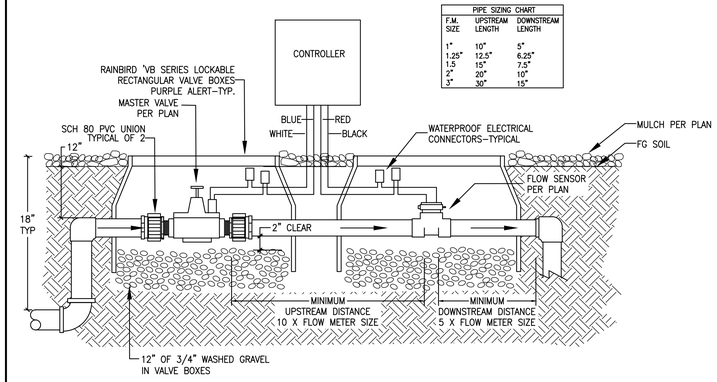


D QUICK COUPLER



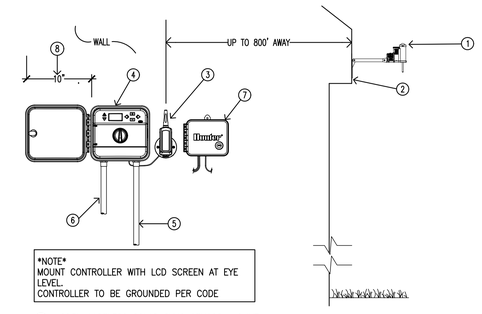
1. RAINBIRD 'VB SERIES' 10" ROUND PLASTIC VALVE BOX W/LOCKING LID
2. VALVE BOX LID–COLOR: PURPLE
3. FINISH GRADE
4. 3/4" CRUSHED ROCK – 6" DEPTH
5. BALL VALVE PER IRRIGATION PLAN
6. COMMON BRICK – 3 REQUIRED
7. SCH 40 PVC UNION – 2 REQUIRED
8. MAINLINE PIPING PER IRRIGATION PLAN (PURPLE)
9. * VALVE BOX EXTENSION(S) AS REQUIRED LEVEL WITH MULCH IN SHRUB AREAS

E BALL VALVE



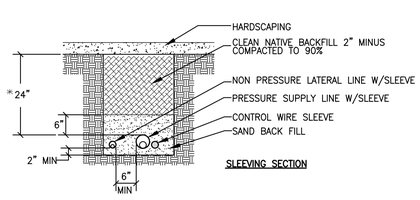
PIPE SIZING CHART		
F.M. SIZE	UPSTREAM LENGTH	DOWNSTREAM LENGTH
1"	10"	5"
1.25"	12.5"	6.25"
1.5	15"	7.5"
2"	20"	10"
3"	30"	15"

F MASTER VALVE AND FLOW SENSOR

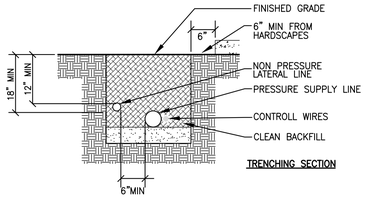


1. MODEL: WIRELESS SOLAR SYNC SENSOR. MOUNT UP TO 800' FROM RECEIVER
2. EVE MOUNT. MOUNT IN LOCATION WHERE SENSOR CAN RECEIVE FULL SUN, IS OPEN TO RAINFALL AND OUT OF SPRINKLER SPRAY PATTERN
3. WIRELESS SOLAR SYNC RECEIVER MOUNTED ON THE WALL NEXT TO THE CONTROLLER
4. HUNTER CONTROLLER PER PLAN
5. VALVE CONTROL WIRE CONDUIT: (1–1/4" MIN.)
6. POWER SOURCE: SUPPLIED BY OWNER
7. FLOW CLIK MODULE (WHERE SHOWN): WIRING PER MANUF. SPECS AND NOTE IN IRRIGATION REFERENCE NOTES
8. DOOR CLEARANCE

G AUTOMATIC CONTROLLER



SLEEVING SECTION



TRENCHING SECTION

SLEEVING NOTES:

INSTALL CONTROL WIRE SLEEVE ADJACENT TO THE PRESSURE SUPPLY LINE, SIZE PER SPEC.

ALL SLEEVES TO BE SCH. 40 PVC AND TO BE 2X THE DIAMETER OF THE LINE TO BE SLEEVED.

* INCREASE THIS DISTANCE TO 36" WHEN SLEEVING UNDER ROADWAYS AND COMMERCIAL TRAFFIC WAYS WHEN INSTRUCTED BY INSPECTOR.

SLEEVES SHALL BE EXTENDED BEYOND HARDSCAPE TO POINTS AS REQUESTED BY INSPECTOR

IF SLEEVES ARE TO BE USED AT A LATER DATE, CONTRACTOR SHALL TAPE ENDS AND PROVIDE A VERTICAL MARK AT ENDS OF SLEEVING VISIBLE AT GROUND LEVEL.

NOTE: ALL PIPING TO BE PURPLE ALERT

TRENCHING NOTES:

FINE GRANULAR MATERIAL WILL BE PLACED ON ALL LINES, NO LARGER THAN 1/2" INCH IN SIZE. THIS WILL BE PERMITTED IN THE INITIAL BACKFILL MEASURED 6" FROM THE TOP OF PIPE. THE REMAINDER OF TRENCH CAN BE FILL WITH ROCK SCREENED 2" MINUS.

ALL BACK FILL IS TO BE SATURATED AND COMPACTED TO 90%

INSTALL ALL PVC PIPE WITH LABEL UP.

SNAKE ALL PIPE IN TRENCH.

BUNDLE AND TAPE ALL CONTROL WIRES AT 10' O.C. TO PRESSURE SUPPLY LINE AND PROVIDE A SERVICE LOOP AT ALL 90 DEGREE CHANGES IN DIRECTION.

PRESSURE MAIN 2" AND LARGER SHALL BE P.V.C. CLASS 315 SMALLER THAN 2" SHALL BE P.V.C. SCHEDULE 40.

CONTRACTOR SHALL PROVIDE SLEEVES OR CONDUIT LINES WHEN MAINLINE INSTALLATION IS UNDER ASPHALT OR CONCRETE.

CONTRACTOR SHALL PROVIDE 24" INCHES OF COVER OVER PIPE SERVING A DRINKING FOUNTAIN OR PRESSURE MAINLINE 3" AND LARGER.

H TRENCHING AND SLEEVING

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE
811
TWO WORKING DAYS BEFORE YOU DIG

LANDSCAPE ARCHITECTS, INC
15 SOUTH 5TH STREET
REDLANDS, CALIFORNIA 92373
PH 909.798.7490 FAX 909.307.8235
CA LIC. NO. 2725 NV LIC. NO. 466
LANDSCAPE ARCHITECTURE IRRIGATION CONSULTANTS WATER FEATURE DESIGNS
LOW VOLTAGE LIGHTING

REGISTERED LANDSCAPE ARCHITECT SHAWN T. BURGIN 10/26 renewal signature 7/21/25 date 2725 STATE OF CALIFORNIA

CITY OF REDLANDS
Municipal Utilities and Engineering Department

WASTE WATER TREATMENT PLANT HILLSIDE STABILIZATION & STAIRWAY IMPROVEMENT PLANS

IRRIGATION DETAILS

BENCHMARK

THE BENCHMARK FOR THIS SURVEY IS A SPIKE AND WASHER SET IN ASPHALT DRIVE 27'± WEST OF NORTHEASTERLY CHAIN LINK FENCE OF SITE AND 17'± NORTH OF NORTHEAST CORNER OF MOST EASTERLY SLUDGE BEDS.

ELEVATION: 1174.00 FEET (NAVD 88)

Letter	Description	Date	Initial	Initial
1	REVISE SHEET NUMBERING: 8/11/25			

Revisions

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Gerard J. Nepomuceno, Civil Engineer RCE #93200

APPROVED BY: DATE: 7/18/2025
Goutam K. Dubey, City Engineer RCE #75645

SHEET 5 OF 9 SHEETS

2475-PG/05/09



PLANT SCHEDULE

SYMBOL	QTY	SIZE	WUCOLS	BOTANICAL NAME	COMMON NAME
TREES					
	6	15 GAL	LOW	ARBUTUS U. MARINA LOW BRANCHED	MARINA STRAWBERRY TREE
	8	15 GAL	LOW	CHILOPSIS LINEARIS 'BURGUNDY LACE' LOW BRANCHED	BURGUNDY LACE DESERT WILLOW
SYMBOL	QTY	SIZE	WULCOS	BOTANICAL NAME	COMMON NAME
SHRUBS					
	35	1 GAL.	LOW	LANTANA X 'NEW GOLD'	NEW GOLD LANTANA
SHRUB COVER					
	231	1 GAL.	LOW	ACACIA REDOLENS 'LOW BOY'	LOW BOY BANK CATCLAW
	70	1 GAL.	LOW	LANTANA MONTEVIDENSIS 'LAVENDER'	LAVENDER LANTANA
SYMBOL	QTY	SIZE	WUCOLS	BOTANICAL NAME	COMMON NAME
MULCHES					
	21,786 SF	3" DEEP		RECYCLED WOOD WALK-ON MULCH INSTALL OVER EROSION CONTROL FABRIC PER DETAIL	ORGANIC MULCH

REFERENCE NOTES SCHEDULE

CODE	DESCRIPTION
CONSTRUCTION NOTES	
A-01	NEW STAIRWAY PER CIVIL PLANS
A-02	NEW RETAINING WALL PER CIVIL PLANS
A-03	EXISTING TREE TO BE REMOVED DUE TO NEW CONSTRUCTION
A-04	EXISTING NATIVE PLANT COVER TO REMAIN
A-05	EXISTING TREE TO BE PROTECTED IN PLACE

LIGHTING SCHEDULE

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	QTY
	FIRSTLIGHT POLE MOUNT #RSL-PTM-BK-ST-T5-NW-00 PROVIDE FOOTINGS AS REQUIRED BY CODES BLACK, 5" DIA X 18' HIGH, BLACK GALV. POLE SOLAR, 4000K	4

PLANTING NOTES

GENERAL NOTES:
REFER TO PROJECT PLANTING SPECIFICATIONS ON SHEET XXX FOR COMPLETE PLANTING SPECIFICATIONS.

ALL LANDSCAPE INSTALLATION SHALL BE PERFORMED BY A LICENSED CONTRACTOR WITH A C-27 LICENSE OR GREATER.

LAYOUT OF ELEMENTS:
CONTRACTOR SHALL SCALE ALL PLANT MATERIALS OFF THE PLANS TO DETERMINE THEIR APPROXIMATE LOCATIONS. REFER TO PLANT SPACING NOTES IN THE PLANTING LEGEND. MAINTAIN A DISTANCE FROM ALL HARDSCAPE ELEMENTS AND GROUND COVERS ONE-HALF THE AMOUNT OF THE SPACING INDICATED IN THE PLANTING LEGEND OR ½ THE SCALED DIMENSION OF THE SHRUB.

SOILS TEST:
AFTER ALL ROUGH GRADING HAS BEEN COMPLETED BUT PRIOR TO SOIL PREPARATION, THE CONTRACTOR SHALL OBTAIN A SOIL TEST FOR AGRICULTURAL SUITABILITY, FERTILITY AND WATER INFILTRATION RATE. TEST SHALL BE PREPARED BY A CALIFORNIA ASSOCIATION OF AGRICULTURAL LABORATORIES MEMBER. FURNISH ONE COPY OF TEST RESULTS TO THE LANDSCAPE ARCHITECT FOR REVIEW PRIOR TO COMMENCING WITH SOIL CONDITIONING. SOILS TEST REPORT SHALL SUPERSEDE ALL SPECIFICATIONS. SOILS TESTING FACILITY SHALL BE INFORMED OF THE REQUIREMENT OF USING ESTABLISH AMENDMENTS PER PLANTING SPECIFICATIONS.

SEE PLANTING SPECIFICATIONS FOR MINIMAL AMENDMENTS TO BE USED FOR BID PURPOSES. ALL FINAL SOIL CONDITIONING AND AMENDING SHALL BE PER SOILS TEST RECOMMENDATIONS. TEST SHALL INCLUDE THE FOLLOWING ITEMS: SOIL TYPE (TEXTURE), PH, TOTAL SOLUBLE SALTS (BY ELECTRICAL CONDUCTIVITY OF THE SOIL SATURATION EXTRACT), BORON LEVEL, EXCHANGEABLE SODIUM PERCENTAGE, NUTRIENTS (N,P,K,), MICRO NUTRIENTS (NO3, NH4, P, K, Ca, Mg, Na, B, Zn, Fe, Cu, Mn, S), PERCOLATION, % OF ORGANIC MATTER, CATION EXCHANGE CAPACITY, BASE SATURATION, EXCESS LIME OR CARBONATES.

GRADING:
FINISH GRADE OF SOIL IN ALL SHRUB PLANTER AREAS (UNLESS OTHERWISE INDICATED) SHALL BE ESTABLISHED SO FINISH GRADE OF SPECIFIED MULCH IS 1/2" BELOW ADJACENT WALKS, CURBS OR PAVING AND BE FREE OF ROCKS OVER 1" IN SIZE IN THE TOP 2" OF SOIL. EXCESS SOIL CREATED DURING THE AMENDING PROCESS SHALL NOT REMAIN ON SITE. ALL ESTABLISHED FLOW-LINES SHALL BE MAINTAINED. CONTRACTOR SHALL GUARANTEE POSITIVE DRAINAGE FROM ALL PLANTED AREAS.

EROSION CONTROL:
SLOPES EXCEEDING 3:1 SHALL RECEIVE EROSION CONTROL NETTING EQUAL TO WESTERN EXCELSIOR #EXCEL CC-4. NETTING TO BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS AND STAPLED AS REQUIRED.

TREE AND SHRUB PLANTING:
BACKFILL MIX FOR TREES AND SHRUBS SHALL CONSIST OF A MINIMUM OF 70% CLEAN ON-SITE SOIL AND 30% CUSTOM AMENDMENT MIX WCP-33. REFER TO SOILS TEST RESULT REQUIRED ABOVE FOR FINAL BACKFILL RECOMMENDATIONS. PLANT PER DETAIL THIS SHEET. ALL EXCESS SOIL CREATED DURING THE AMENDING PROCESS SHALL BE REMOVED FROM SITE AND LEGALLY DISPOSED OF.

TREES:
ALL TREES SHALL HAVE COMPARATIVELY STRAIGHT TRUNKS, WELL-DEVELOPED LEADERS, AND TOPS AND ROOTS CHARACTERISTIC OF THE SPECIES OR VARIETY. ALL TREES MUST BE FREE OF INSECTS, DISEASE, MECHANICAL INJURIES, AND OTHER OBJECTIONABLE FEATURES AT THE TIME OF PLANTING.

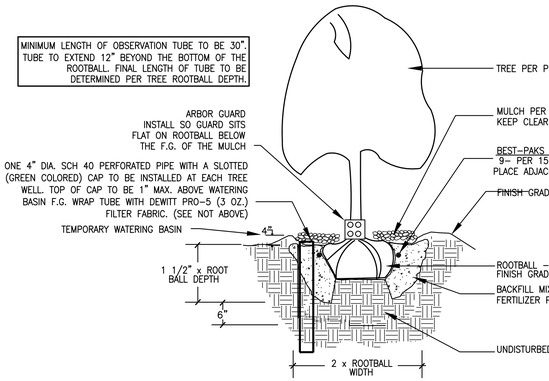
TREE STAKING:
STAKE ALL TREES PER DETAIL ON THIS SHEET. ALL STAKES SHALL EXTEND A MINIMUM OF 12" BELOW THE PLANTING PIT.

QUANTITIES:
QUANTITIES SHOWN ARE AN AID ONLY, CONTRACTOR SHALL VERIFY ALL QUANTITIES PRIOR TO BIDDING/ COMMENCING WORK.

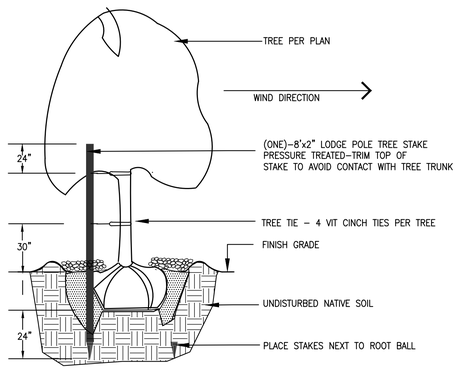
ENVIRONMENTAL ISSUES:
THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLYING WITH ALL STORM WATER PHASE I AND II RULES AND ANY OTHER ENVIRONMENTAL PROTECTION LAWS IN EFFECT AT THE TIME OF CONSTRUCTION.

LANDSCAPE CERTIFICATIONS/DOCUMENTATION:
CONTRACTOR SHALL BE RESPONSIBLE FOR REVIEWING, AND COMPLYING WITH, ALL STATE AND LOCAL ORDINANCES REGARDING THE WATER USAGE CERTIFICATIONS ON THIS PROJECT SITE.

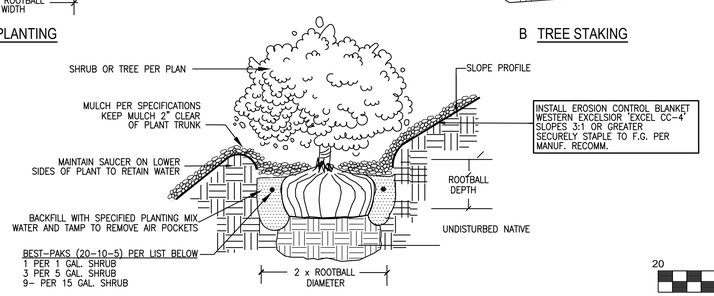
REFER TO SHEET 8 FOR PLANTING SPECIFICATIONS



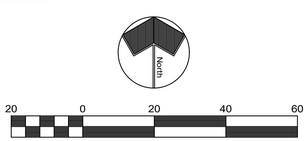
A TREE PLANTING



B TREE STAKING



C PLANTING ON SLOPES



PLANTING INSPECTION NOTE TO CONTRACTOR:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE CITY, COUNTY OR OTHER PRESIDING AUTHORITY, THE LANDSCAPE ARCHITECT AND THE OWNER, AS NECESSARY, TO FACILITATE ALL PLANTING INSPECTIONS REQUIRED THAT RELATE TO OBTAINING CERTIFICATIONS OF COMPLETION.

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE
811
TWO WORKING DAYS BEFORE YOU DIG

BENCHMARK

THE BENCHMARK FOR THIS SURVEY IS A SPIKE AND WASHER SET IN ASPHALT DRIVE 27'± WEST OF NORTHEASTERLY CHAIN LINK FENCE OF SITE AND 17'± NORTH OF NORTHEAST CORNER OF MOST EASTERLY SLUDGE BEDS.

ELEVATION: 1174.00 FEET (NAVD 88)

LANDSCAPE ARCHITECTS, INC
LANDSCAPE ARCHITECTURE IRRIGATION CONSULTANTS WATER FEATURE DESIGNS
15 SOUTH 5TH STREET
REDLANDS, CALIFORNIA 92373
PH 909.798.7490 FAX 909.307.8235
CA LIC. NO. 2725 NV LIC. NO. 466
LOW VOLTAGE LIGHTING

REGISTERED LANDSCAPE ARCHITECT SHAWN T. BURGIN 10/26 exp. date signature 7/21/25 date 2725 STATE OF CALIFORNIA

CITY OF REDLANDS
Municipal Utilities and Engineering Department

WASTE WATER TREATMENT PLANT HILLSIDE STABILIZATION & STAIRWAY IMPROVEMENT PLANS

PLANTING PLAN

Letter	Description	Date	Initial	Initial
1	REVISE LIGHTING REFERENCE NOTE: 8/11/25			
	REVISE SHEET NUMBERING			

Revisions

Checked by: _____ Date: _____
Checked by: _____ Date: _____
Checked by: _____ Date: _____
Checked by: _____ Date: _____

REVIEWED BY: _____ DATE 7/18/2025
Gerard J. Nepomuceno, Civil Engineer RCE #93200
APPROVED BY: _____ DATE 7/18/2025
Goutam K. Dubey, City Engineer RCE #75645

SHEET 6 OF 9 SHEETS

2475-PG/06/09

IRRIGATION SYSTEM SPECIFICATIONS

1.1 SCOPE OF WORK:

.1 Install a new underground irrigation system as shown and specified. Furnish labor, materials, equipment, appliances and services necessary for the execution and completion of "Landscape Irrigation" as indicated on the drawings and/or herein specified. The work includes but is not limited to:

.1 Installation of piping, fittings, sprinkler heads/ water emission devices, controllers, valves, wiring, irrigation equipment, sleeving and accessories.
.2 Testing and adjustment.
.3 Excavating and backfilling irrigation system work.
.4 Refurbishment/modifications to existing irrigation systems.

1.2 SUBMITTALS:

.1 Provide the following submittals to the Client's Representative for approval prior to commencing any irrigation construction: No substitutions will be allowed without prior written approval of the Client's Representative.

.1 Written proof of available water pressure at the point-of-connections.
.2 Manufacturer's product data for all proposed irrigation equipment indicated on the drawings-ie: sprinklers, driplines, emitters, bubblers, control valves, controllers, wiring, piping, fittings, valve boxes, filtration, wire connectors, etc.
.3 Equipment or materials installed or furnished without the prior approval of the Client'S Representative may be rejected and such material removed from the site at no expense to the Client.
.4 Approval of any items, alternates, or substitutes indicates only that product(s) apparently meet the requirements of the drawings and specifications on the basis of the information or samples submitted.
.5 Manufacturer's warranties shall not relieve liability under the guarantee. Such warranties shall only supplement the guarantee. The Client's Representative may, at his option, require a manufacturer's warranty on any product offered for use.

1.3 Record Drawings:

.1 Record accurately on one set of contract drawings all changes in the work constituting departures from the original contract drawings.
.2 The changes and dimensions shall be recorded in a legible and workmanlike manner to the satisfaction of the Clients' Representative. Prior to final inspection of work, submit record drawings to the Client's Representative for approval.
.3 Dimension from two permanent points of reference (buildings, monuments, sidewalks, curbs, pavement, etc.). Data to be shown on record drawings shall be recorded day to day as the project is being installed and shall be made available to the Client's Representative upon request. All lettering on drawings shall be minimum 1/8 inch in size.
.4 Show locations and depths of the following items:
.1 Point of connection.
.2 Routing of sprinkler pressure lines (dimension maximum 100 feet along routing).
.3 Gate valves.
.4 Sprinkler control valves.
.5 Quick coupling valves
.6 Routing of control wires.
.7 Related equipment (as may be directed)

.5 Maintain record drawings on site at all times. Upon completion of work, transfer all record drawing information and dimensions, in ink, to reproducible prints available from Client's Representative at cost.

1.4 INSPECTIONS

.1 Inspections will be required for:
.1 Pressure test of all new irrigation main lines. Test at 150 P.S.I. for four hours. Contractor shall provide all required test pumps, gauges and temporary isolation valves as required.
.2 Pipe depth.
.3 Coverage test.
.4 Final inspection/ start of maintenance. Final inspection shall be performed by the Client's Representative.
.5 Final acceptance.
.2 Inspection requests:
.1 Contractor shall notify the Client's Representatives in advance for requesting all inspections as follows:
Pre-job conference/ walk- 120 hours (5 working days)
Pressure supply line installation and testing- 72 hours (3 working days)
System layout and coverage Tests- 72 hours (3 working days)
Final Inspection _ 72 hours (3 working days)
Final Acceptance _ 72 hours (3 working days)
.3 Do not allow or cause the above items to be buried prior to inspection and approval by the Client's's Representative. A 72-hour notice shall be given prior to anticipated inspections.
.4 When inspections have been conducted by other than the Client's Representative, the Contractor shall show evidence of when and by whom these inspections were made and who authorized.
.5 No inspection will commence without record prints. In the event the Contractor calls for an inspection without up to date record prints, without completing previously noted corrections, or without preparing the system for inspection, the inspection will be canceled and the Contractor back charged for the direct costs of all personnel time and consultant time lost.
.6 Closing In Uninspected Work:
.1 Do not allow or cause any of the work of this section to be covered up or enclosed until it has been inspected, tested, and approved by the Client's Representative. Day and night barricades shall be provided as needed for all open trenches.

1.5 TURNOVER ITEMS

.1 Controller Charts:
.1 Record drawings: Must be reviewed by the Client's Representative before charts are prepared.
.2 Provide one controller chart for each automatic controller. Chart shall show the area covered by the controller and color-coded legend with corresponding irrigation control valves with each valve/zone location clearly defined.
.3 The chart is to be a reduced copy of the actual record drawing. In the event the controller sequence is not legible when the drawing is reduced, it shall be enlarged to a readable size.
.4 Chart shall be a black line print with a different color used to show the area of coverage for each station. Chart shall be approved by the Client's Representative prior to final approval.
.5 When completed and approved, the chart shall be hermetically sealed between two pieces of plastic, each piece being a minimum 20 mils in thickness.
.2 Spare Equipment and Accessories
.1 Contractor shall provide Client five (5) spare sprinkler heads and emission devices of each model used including full nozzle sets and two (2) of any specialty or proprietary tools required to adjust or maintain said sprinkler heads.
.2 Contractor shall provide Client's two (2) Quick Coupler key assemblies including swivel and one 1' commercial grade 75-foot hose, and two (2) cop keys to open Quick Coupler cap.
.3 Prepare and deliver to the Client's Representative within ten days by calendar prior to completion of construction, all required and necessary descriptive material in complete detail and sufficient quantity, properly prepared in individual bound copies of the operation and maintenance manual. The manual shall describe the material installed and shall be in sufficient detail to permit the operating personnel to understand, operate, and maintain all equipment. Spare parts lists and related manufacturer information shall be included for each equipment item installed. Binders may be standard 3-ring type or similar permanent type clearly labeled on front and spine.
.4 Contractor shall provide the Client's with any and all other accessories, keys, installation, repair, maintenance instructions, rebate forms, or other items included with equipment and supplies from manufacturers.
.5 The above equipment shall be turned over to the Client at the conclusion of the project. Before final acceptance can occur, evidence that the Client has received materials must be shown to the Client's Representative.
.6 In addition to the above maintenance manuals, provide the maintenance personnel with instructions for major equipment and show written evidence to the Client's Representative at the conclusion of the project that this service has been rendered.

1.6 GUARANTEE

.1 General: All work done under this contract, shall be guaranteed against all defects and fault of material and workmanship for a period of one (1) year following the filing of the Notice of Completion. All materials used shall carry a manufacturer's guarantee of one (1) year minimum.
.2 Should any problem with the irrigation system be discovered within the guarantee period, it shall be corrected by the Contractor at no additional expense to the Client's within ten (10) calendar days of receipt of written notice from the Client's. When the nature of the repairs as determined by the Client's constitute an emergency (e.g. broken pressure line) the Client's may proceed to make repairs at the Contractor's expense. Any and all damages to existing improvement resulting either from faulty materials or workmanship, or from the necessary repairs to correct same, shall be repaired to the satisfaction of the Client's by the Contractor, all at no additional cost to the Client's.
.3 Guarantee shall be submitted on Contractor's own letterhead as follows:

GUARANTEE
FOR SPRINKLER IRRIGATION SYSTEM

We hereby guarantee that the sprinkler irrigation system we have furnished and installed is free from defects in materials and workmanship, and the work has been completed in accordance with the drawings and specifications, ordinary wear and tear and unusual abuse, or neglect expected. We agree to repair or replace any defects in materials or workmanship which may develop during the period of one year from date of filing of the Notice of Completion and also to repair or replace any damage resulting from the repairing or replacing of such defects at no additional cost to the Client's. We shall make such repairs or replacements within 10 calendar days following written notification by the Client's. In the event of our failure to make such repairs or replacements within the Time specified after receipt of written notice from the Client's, we authorize the Client's to proceed to have said repairs or replacements made at our expense and we will pay the costs and charges therefore upon demand.

PROJECT: _____ LOCATION: _____

SIGNED: _____ ADDRESS: _____

PHONE: _____

_____

.4 After the system has been completed; the Contractor shall instruct the Client's in the operation and maintenance of the system and shall furnish two complete sets of operating instructions.
.5 Any settling of trenches which may occur during the one_year period following acceptance shall be repaired to Client's satisfaction by the Contractor without any additional expense to the Client's. Repairs shall include the complete restoration of all damage to planting, paving or other improvements of any kind as a result of the work.

PART 2- MATERIALS

2.1 GENERAL

.1 Materials or equipment installed or furnished that does not meet the Client's standards will be rejected and shall be removed from the site at no expense to the Client's.

2.2 PIPE

.1 Pressure supply lines larger than 4" shall be Class 200 gasketed (Ring-Tite) PVC pipe.
.2 Pressure supply lines 2 to 4 inches in diameter shall be Class 315 solvent weld PVC.
.3 Pressure supply lines 1-1/2 inches in diameter and smaller shall be Schedule 40 solvent weld PVC.
.4 All non-pressure lines shall be PVC-size and type per Irrigation Legend with no pipe smaller than 3/4' being used.
.5 Pressure supply line from point of connection through backflow prevention unit shall be per local code.

2.3 PLASTIC PIPE AND FITTINGS

.1 All pipe shall be extruded of an improved PVC virgin pipe compound featuring high tensile strength, high chemical resistance and high impact strength. In terms of the current ASTM Standard D-1769 or D-2241, this compound shall meet the requirements of cell classification 12454B for pipe and 13454B for fittings. This compound must have a 2,000 psi hydrostatic design stress rating.
.2 All pipe must bear the following markings: Manufacturer's name, nominal pipe size, schedule or class, pressure rating in P.S.I., and NSF (National Sanitation Foundation). The manufacturer shall also mark the date of extrusion on the pipe.
.3 Solvent cement joints for plastic pipe and fittings shall be made as prescribed by the manufacturer. The high chemical resistance of the pipe and fitting compounds specified in the foregoing sections makes it mandatory that an aggressive primer, which is a true solvent for PVC, be used in conjunction with a solvent cement designed for the fit of the pipe and the fittings of each size range specified.
.4 Each pipe installer expected to make solvent joints shall receive instructions in the proper assembly of such joints from the representative of either pipe, cement, or fitting manufacturer before starting the job, unless he has been previously instructed on recommended solvent cementing procedures by a competent representative of the manufacturer.
.5 All fittings shall be standard weight schedule 40. At the purchaser's discretion, contract preference may be given those suppliers able to furnish all types of fittings required under this contract from a single manufacturer, in order that responsibility will not be divided in warranty claim situations.
.6 All fittings shall be injection molded of an improved PVC fittings compound featuring high tensile strength, high chemical resistance, and high impact strength. In terms of the current ASTM Standard D-1784-69, the compound must meet the requirements described in cell classification 13454B. Where threads are required in plastic fittings, these shall be injection molded also. All tees and ells shall be side gated.
.7 Apply primer and solvent on all pipe sizes and fittings. Primer solvent on both female and male ends. All solvent cementing of plastic pipe and fittings shall be a two_step process, using primer and solvent cement applied per the manufacturer's recommendations. Cement shall be of a fluid consistency, not gel_like.
.8 All fittings shall bear the company's name or trademark, material designation, size applicable I.P.S. schedule, and NSF seal of approval.
.9 All threaded nipples shall be standard weight Schedule 80, with molded threads.

2.4 PVC CONDUIT/SLEEVING

.1 Pipe that is used for control wires sleeving shall be PVC conduit Schedule 40: Type 1220. All wires under paving shall be installed in PVC conduit, or sleeves as indicated in details and Legend.

2.5 RING-TITE PVC PIPE

.1 All Ring-tite pipe indicated on the working drawings, shall be minimum Class 160 PSI Johns-Manville PVC pipe with ring-tite joints.
.2 All ring-tite joints shall be sealed with rubber rings as provided by the manufacturer. All pipe joints shall provide for expansion and contraction.
.3 Thrust blocks shall be provided as required for proper anchorage and durability of the ring-tite pipe. (Refer to Details)

2.6 ADJUSTABLE ARC, ADJUSTABLE RADIUS, MATCHED PRECIPITATION RATE, MULTI-STREAM, MULTI-TRAJECTORY, ROTATING STREAM SPRINKLER

1. The sprinkler and nozzles shall be as indicated in the Irrigation Legend or approved equal.

2.7 ELECTRIC CONTROLLERS and ENCLOSURES

.1 The automatic controller shall be as indicated in the Irrigation legend.
.2 All wiring to and from the controller shall be through color-coded fittings.
.3 Contractor to install a grounding rod for all inclosure installed controllers per local electrical codes and manufacturers recommendations.

2.8 ELECTRIC CONTROL VALVES

.1 The electric remote control valve shall be as indicated in the Irrigation Legend. The valve pressure rating shall not be less than 200 psi.
.2 The valve shall be capable of being operated in the field manually without electricity using a bleed valve or equal.
.3 The valve shall be capable of being serviced in the field without removing it from the supply line.
.4 Provide waterproof plastic marker tags for all remote control valves. Tags shall indicate the respective controller station of each valve and 'purple-alert' notification if required.

2.9 DRIP IRRIGATION COMPONENTS

.1 Provide Drip Control Zone Kits as indicated in the Irrigation Legend.
.2 The drip tubing shall be as specified in the Irrigation Legend.

2.10 QUICK COUPLER VALVES

.1 The quick coupling valve shall be in the Irrigation Legend and have a two piece type capable of having a discharge rate of 15 gallons per minute (G.P.M.) with a pressure loss not to exceed 4.3 pounds per square inch (PSI).
.2 The valve body shall be constructed of heavy cast brass. The cover shall be a durable, protective self-closing rubber cover. When so specified, the cover shall be a locking rubber cover (LRC).
.3 The valve shall be opened and closed by a brass key of the same manufacturer having a 3/4" (MNPT) and 3/4 " (FNPT) outlet. The valve throat shall have a keyway with detent positions for regulating water flow.

2.11 WIRING, LOW VOLTAGE

.1 Connections between the controller and remote control valves shall be made with valve manufacturer's wire chart and specifications.
.2 Wiring shall occupy the same trench and shall be installed along with the same route as the pressure supply lines wherever possible.
.3 Where more than one wire is placed in a trench, the wiring shall be taped together at intervals of 10 feet.
.4 All splices shall be made using Scotch Lok Unipack waterproof sealing packets, Pen-Tite Connectors, or equal. An expansion loop of 18" shall be provided at each wire connection and directional turn.
.5 Sizing of wire shall be according to manufacturer recommendations, in no case less than AWG #12 gauge unless otherwise noted.
.6 Use a continuous wire between controller and remote control valves. Under no circumstances shall splices exist without prior written approval. Any splices allowed shall be installed in an approved box.
.7 All ground wires shall be white AWG #12 size unless noted otherwise.
.8 Provide spare orange wires from controller to the end each mainline branch in system as shown on the plans to be used as required as a spare. Label these wires as spare in the controller. Loop wires into each valve box along the mainline run.
.9 Provide a tracer wire over all new mainline installations.

2.12 BACKFLOW PREVENTERS

.1 Shall be Reduced Pressure type listed in the Irrigation Legend or approved equal.

2.13 VALVE BOXES

1. Valve boxes shall be used as durable, rigid enclosures for valves or other irrigation system components requiring subsurface protection for installation or maintenance. The valve box shall be made of structural foam HDPE resin that is resistant to UV light, weather, moisture, and chemical action of soils.
2. The standard rectangular body shall have knock-outs molded into the sides that can be readily removed. The knock-outs shall remain an integral part of the body unless removed to run pipes or wires through the valve box.
3. The valve box shall have corrugated sides. Rectangular valve boxes shall have a grooved feature on one side, just below the lid at the top of the box, for inserting a shovel blade or other prying tool to provide easy lid removal. This is useful following compaction of the surrounding soil or after the eventual accumulation of thatch over the valve box.
4. Extension models shall have vertical ribs inside that make them capable of being mounted directly over the top of another box.
5. Boxes shall have a stepped feature on the bottom that securely interlocks two boxes together when mated bottom-to-bottom for use in a deep installation.
6. There shall be no hole in the valve box lid unless the bolt-hole knock-out is removed in order to use the locking bolt. Lids shall be green unless otherwise stated and have beveled
7. edges to minimize potential damage from lawn equipment. Lids shall be clearly marked with the words 'Irrigation Control Valve' molded onto the top. Lids shall have a marking area measuring at least 6" by 2" that is suitable for branding or other means of identification.
8. The locking bolt, washer, and clip shall be made of stainless steel.
9. The valve box shall be manufactured by Rain Bird Corporation, Azusa, California. or approved equal.

2.14 GATE AND BALL VALVES

Approved gate and ball valves shall be as indicated in the Irrigation Legend. Size and location shall be as indicated on Plan.

2.15 ELECTRICAL, HIGH VOLTAGE

.1 Power to and connection to the automatic controller shall be provided by the Client.
.2 All electrical equipment outside of buildings shall be Nema 3 type, waterproof for such installation.
.3 All high voltage work shall be installed under this section. Refer to Wiring, Low Voltage for additional information.

PART 3 - EXECUTION

3.1 GENERAL

.1 Layout:

.1 Layout irrigation systems and make minor adjustments required due to differences between site and drawings. Where piping is shown on drawings under paved areas, but running parallel and adjacent to planted areas, install the piping in the planted areas. All work called for on the drawings by notes shall be furnished and installed whether or not specifically mentioned in the specifications.

.2 Diagrammatic Intent:

.1 The drawings are essentially diagrammatic. The size and location of equipment and fixtures are drawn to scale where possible. Provide offsets in piping and changes in equipment locations as necessary to conform to present and future structures and to avoid obstructions or conflicts with other work.
.2 Coordinate the installation of all sprinkler materials, including pipe, with the landscape drawings, to avoid interfering with the trees, shrubs, other planting and other equipment being installed by the various trades.
.3 Do not willfully install the sprinkler system as indicated on the drawings when it is obvious in the field that unknown obstructions or grade differences exist, that might not have been considered in the engineering or if discrepancies in construction details, legend, or specific notes are discovered. All such obstructions or discrepancies should be brought to the attention of the Client's Representative. In the event this is not done, the Contractor must assume full responsibility for revisions necessary. Before any work commences, confer with the Client's Representative regarding general details of work of this contract.

.3 Grades:

.1 Before starting work, carefully check grades to determine that work may safely proceed, keeping within the specified material depths with respect to finish grade.

.4 Inspections:

.1 Prior to all work of this section carefully inspect the installed work of other trades and verify that all work is complete to the point where installation may properly commence.
.2 Verify that irrigation system may be installed in strict accordance with all pertinent codes and regulations, the original design, the referenced standards, and the manufacturer's recommendations.

.5 Discrepancies:

.1 In the event of discrepancy notify the Landscape Architect and Client's Representative. The Landscape Architect shall be responsible for the interpretation of any irrigation design questions.
.2 Do not proceed with installation in areas of discrepancy until all discrepancies have been resolved.
.3 Layout sprinkler heads and make any minor adjustments required due to differences between site and drawings. Any such deviations in layout shall be within the intent of the original drawings, and without additional cost to the Client. Layout shall be approved by the Client's Representative before installation.

.6 Field Measurements:

.1 Make all necessary measurements in the field to ensure precise fit of items in accordance with the original design. Contractor shall coordinate the installation of all irrigation materials with all other work.

.7 Materials:
.1 Materials shall be of first quality and of domestic manufacturer whenever possible unless otherwise noted.

3.2 WATER SUPPLY

Connections at the point of connection (POC) shall be at the approximate location(s) shown in the drawings. Minor changes caused by actual site conditions shall be made without additional cost to the Client.

3.3 TRENCHING

.1 Dig trenches and support pipe continuously on bottom of ditch. Lay pipe to an even grade. Trenching excavation shall follow layout indicated on drawings to the depths below finished grade and as noted. Where lines occur under paved areas, these dimensions shall be considered below subgrade.
.2 Provide minimum cover of 24 inches on pressure supply lines 4 inches and larger.
.3 Provide minimum cover of 18 inches on pressure supply lines 3 inches and smaller.
.4 Provide minimum cover of 18 inches for wires.
.5 Provide minimum cover of 12 inches for non-pressure lines.
.6 Provide minimum cover of 24 inches for all pipe sleeved under paving.
.7 Provide horizontal clearance between pipes per Trenching/ Sleeving Detail.
.8 Where it is necessary to excavate adjacent to existing trees, the Contractor shall avoid injury to trees and tree roots. Excavation in areas where 2 inch and larger roots occur shall be done by hand. All roots 2 inches and larger in diameter shall be tunneled under and shall be heavily wrapped with wet burlap to prevent scarring or drying. Where trenching machine is run close to trees having roots smaller than 2 inches in diameter, the wall of the trench adjacent to the tree shall be hand trimmed, making a clean cut through the roots. Roots 1 inch and larger in diameter shall be painted with two coats of Tree Seal or approved equal. Trenches adjacent to trees shall be closed within 24 hours.

3.4 BACKFILLING

.1 Initial backfill on all lines shall be of fine granular material with no foreign matter larger than 1 inch in size.
.2 Backfill shall be tamped in 4 inch layers under the pipe and uniformly on both sides for the full width of the trench and the full length of the pipe. Materials shall be sufficiently damp to permit thorough compaction, free of voids. Backfill shall be compacted to dry density equal to adjacent undisturbed soil and shall conform to adjacent grades.
.3 Flooding in lieu of tamping is not allowed without specific prior approval.
.4 Under no circumstances shall truck wheels be used to compact soil.
.5 Provide sand backfill a minimum of 4 inches over and under all piping under paved areas.

3.5 PIPING

.1 Piping under existing pavement may be installed by jacking, boring, or hydraulic driving. No hydraulic driving is permitted under asphaltic concrete pavement.
.2 Cutting or breaking of existing pavement is not permitted.
.3 Carefully inspect all pipe and fittings before installation, removing dirt, scale, and burrs and reaming; install pipe with all markings up for visual inspection and verification.
.4 Exercise care in handling, loading, unloading, and storing plastic pipe and fittings; store plastic pipe and fittings under cover until ready to install; transport plastic pipe on a vehicle with a bed long enough to allow the pipe to lay flat, avoid undue bending and any concentrated external load.
.5 Remove all dented and damaged pipe sections
.6 Contractor shall install concrete thrust blocking at all changes of direction and terminal points of pressure pipe when indicated in plans.
.7 All lines shall have a minimum clearance of 4 inches from each other and 6 inches from lines of other trades.
.8 Parallel lines shall not be installed directly over one another.
.9 PVC pipe shall be stacked in a manner which will provide for expansion and contraction as recommended by the pipe manufacturer installed label up.
.10 In solvent welding, use only the specified primer and solvent cement and make all joints in strict accordance with the manufacturer's recommended methods; allow solvent welds at least 15 minutes setup time before moving or handling and 24 hours curing time before filling.
.11 360 degree applicators shall be used to apply primer and solvent on sizes 2-1/2 inches and larger.
.12 Centerload all plastic pipe prior to pressure testing.
.13 All threaded plastic to plastic connections shall be assembled using Teflon tape.
.14 For plastic to metal connections, work the metal connections first. Use a non-hardening pipe dope on all threaded plastic to metal connections, except where noted otherwise.
.15 Main lines shall be tested in place before backfilling for a period of not less than four (4) hours and shall shown no leakage or loss of pressure. During the test period, minimum test pressure, at the highest point of the section being tested, shall be 150 pounds per square inch. Center filling of pipe lengths is allowed.

3.6 RING-TITE PCV INSTALLATION

.1 Except as may be noted in other parts of the Specifications or on the drawings, installation of Ring-Tite pipe and connecting fittings shall be outlined in manual as furnished by pipe manufacturer, or as set forth by the Johns-Manville Company Manual #772-62A. This shall include, but not be limited to, the installation of the pipe at the proper depth and the correct location of concrete thrust blocks of adequate sizes. Contractor shall make available the services of the manufacturer's representative at the start of the installation and during construction.

3.7 SPRINKLERS

.1 All nozzles on sprinklers shall be tightened after installation. All sprinklers having an adjustment stem shall be adjusted on a lateral line for the proper radius, diameter and/or gallonage per approval of the Client's Representative.
.2 Sprinkler heads and risers shall be installed according to details for final approval.
.3 Spacing of heads shall not exceed the maximum indicated on the drawings. In no case shall the spacing exceed the maximum recommendation by the manufacturer.

3.8 VALVES

.1 Remote control valves shall be adjusted in order that a uniform distribution of water is applied by the sprinkler heads to the planting areas for each individual valve system.
.2 Quick coupling valves shall be set approximately 12" from walks, curbs, header boards, or paved areas where designed. Refer to installation detail. Place quick couplers in valve boxes.

3.9 VALVE BOXES

.1 Valve boxes shall be set one inch (1") above the designated finish grade in lawn areas and three inches (3") above finish grade in ground cover areas.
.2 Valve boxes installed near walks, curbs, header boards, and paving shall not abut those items. Top surfaces shall be flush with, and perpendicular to, items listed above.
.3 Valve boxes shall be installed in shrub planters, not in turf areas whenever possible, unless otherwise approved.

3.10 CONTROLLER LOCATION AND INSTALLATION

.1 The automatic controller shall be installed at the approximate location shown on the Plan, unless otherwise instructed by the Client's Representative.
.2 All local and other applicable codes shall take precedence in connecting the 120 volt electrical service to the controller. Client shall provide power to controller. Irrigation Contractor shall complete hook-up to controller.
.3 There shall be adequate coverage of earth (18" minimum) over the 24-volt control wire. Bundle and tape wires at 10' O.C. and install adjacent to mainline.

3.11 BACKFLOW PREVENTER

.1 The backflow prevention units shall be installed as shown on Plans and Details. Backflow prevention units shall be installed per local codes including certification.

3.12 ASSEMBLIES

.1 Install all assemblies specified herein according to the respective detail drawings or specifications, using best standard practice.
.2 Install the backflow assembly at the height required by local codes.
.3 Routing of pressure supply lines as indicated on drawings is diagrammatic. Install lines (and various assemblies) to conform with the details on the plans.
.4 Brass pipe and fittings shall be assembled using Teflon dope, or equivalent, applied to the male threads only. This is also true of plastic pipe and threaded fittings.

3.13 FLUSHING THE SYSTEM

.1 After all new sprinkler PVC piping, poly tubing and risers are in place and connected, all necessary work has been completed and prior to the installation of sprinkler heads, control valves shall opened and a full head of water used to thoroughly flush out the system.
.2 At the conclusion of a system flushing, the heads shall be installed and tested for operation in accordance with design requirements under normal operating pressure. Contractor shall verify head pressures with pitot tube and adjust valve to correspond with design pressure.

3.14 ADJUSTING THE SYSTEM

.1 Contractor shall adjust valves, align heads, and check coverage of each system prior to coverage test.
.2 If it is determined by the Client's Representative that additional adjustments or nozzle changes will be required to provide proper coverage, or reduce overspray, all necessary changes or adjustments shall be made prior to any planting at no additional cost to the Client.
.3 The entire system shall be operating properly before any planting operations commence.
.4 Contractor to adjust all bubblers, emitters, sprayheads and driplines to assure no flooding occurs causing erosion to the slopes. Any erosion caused by incorrectly adjusted irrigation or controller shall be repaired by the contractor at no additional cost to the Client.

3.15 COVERAGE TEST

.1 When the sprinkler system is completed, perform a coverage test in the presence of the Client's Representative to determine if the water coverage for planting areas is complete and adequate. The Contractor shall furnish, at his or her cost, all materials and perform all work required to correct any inadequacies of coverage due to deviations from plans, or where the system has been willfully installed when it is obviously inadequate if not brought to thee Client's attention before installation. This test shall be accomplished before planting begins.

3.16 HYDROSTATIC TEST

.1 All Hydrostatic tests shall be made only in the presence of the Client's Representative, or other duly authorized representative of the Client. No pipe shall be backfilled until it has been inspected, tested, and approved in writing. Pressure supply lines shall be tested under a hydrostatic pressure of 150 pounds per square inch for a period of four hours.

3.17 COMPLETION CLEANING

.1 Upon completion of each phase of work, Contractor shall smooth all ground surfaces; remove excess materials, rubbish, debris, etc.; sweep adjacent streets, curbs, gutters, walkways, and trails; and remove construction equipment from the premises.

**** END OF SECTION ****

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE
811
TWO WORKING DAYS BEFORE YOU DIG

BENCHMARK

THE BENCHMARK FOR THIS SURVEY IS A SPIKE AND WASHER SET IN ASPHALT DRIVE 27'± WEST OF NORTHEASTERLY CHAIN LINK FENCE OF SITE AND 17'± NORTH OF NORTHEAST CORNER OF MOST EASTERLY SLUDGE BEDS.

ELEVATION: 1174.00 FEET (NAVD 88)

Letter	Description	Date	Initial	Initial
1	REVISE SHEET NUMBERING: 8/11/25			

Revisions

LANDSCAPE ARCHITECTS, INC
15 SOUTH 5TH STREET
REDLANDS, CALIFORNIA 92373
PH 909.798.7490 FAX 909.307.8235
CA LIC. NO. 2725 NV LIC. NO. 466
LANDSCAPE ARCHITECTURE IRRIGATION CONSULTANTS WATER FEATURE DESIGNS LOW VOLTAGE LIGHTING

REGISTERED LANDSCAPE ARCHITECT SHAWN T. BURTON 10/26 exp. date signature 7/21/25 2725 STATE OF CALIFORNIA

CITY OF REDLANDS
Municipal Utilities and Engineering Department

WASTE WATER TREATMENT PLANT HILLSIDE STABILIZATION & STAIRWAY IMPROVEMENT PLANS

IRRIGATION SPECIFICATIONS

Checked by: _____ Date: _____
Checked by: _____ Date: _____
Checked by: _____ Date: _____
Checked by: _____ Date: _____

REVIEWED BY: _____ DATE 7/18/2025
Gerard J. Nepomuceno, Civil Engineer RCE #93200
APPROVED BY: _____ DATE 7/18/2025

SHEET 7 OF 9 SHEETS

2475-PG/07/09

PLANTS AND GROUND COVERS

1.1 GENERAL

.1 Provide trees, plants, ground covers, import soil, wood mulch, tree pruning and equipment as shown and specified. The work includes but is not limited to:

.1 Soil testing and analysis per notes on plans.
.2 Trees, shrubs, and ground covers.
.3 Planting mixes and amendments.
.4 Stone/Wood mulch and planting accessories.
.5 Maintenance.
.6 Weed and rodent control.
.7 Pruning of existing trees to remain.
.8 Removal of trees/shrubs/concrete per plans.
.9 Product Submittals for plant materials (provide photos of all plants), including but not limited to; tree stakes, root deflector fabric, soil amendments, fertilizers, boulders, rock mulches, etc.

1.2 GUARANTEE:

.1 All trees installed under this contract shall be guaranteed against any and all poor, inadequate or inferior materials and/or workmanship for a period of one (1) year.
.2 During the guarantee period, any material found to be dead, missing, or in poor condition shall be replaced by the Contractor within ten (10) days of written notification. The Client's authorized representative shall be the sole judge as to the condition of the material.
.3 Replacement shall be made in accordance with these specifications and the plans.
.4 Material and labor involved in replacing plant material shall be provided by the Contractor at no additional cost to the Client.

1.3 INSPECTIONS:

.1 Inspections will be required. The Contractor shall contact the Client Representative at least 72 hours (3 working days) in advance of an anticipated inspection. An inspection will be required at each of the steps listed below:

.1 Upon completion of fine grading for acceptance of fine grading work prior to installation of irrigation systems.
.2 When trees and shrubs are spotted for planting, but before planting holes are excavated.
.3 When planting and all other indicated or specified work has been completed.
.4 During application of pre-emergent chemical.
.5 At start of plant establishment and maintenance period, current with final acceptance of the project for maintenance by the Client. This acceptance for maintenance will be confirmed in writing by the Client's Representative.

1.4 SUBMITTALS:

.1 The following written certifications are required to be submitted to the Client's Representative upon delivery of the respective materials to the job site:

Total Quantity of commercial fertilizers by type
Total Quantity of import soil, soil amendments and conditioners by type
Total Quantity of decomposed granite, stone and wood mulch

.2 The Contractor shall provide to the Client's Representative a complete submittal package of cut-sheets describing all planting materials to be used, including pictures of all plants and boulders as called out in the approved landscape construction documents prior to beginning work. Contractor shall also submit the required soils test results and supply a one pound sample of all mulches and amendments-if different than as specified on plans.

2.1 FERTILIZER, SOIL AMENDMENTS AND CONDITIONERS:

.1 Planting Packets: (BEST-PAKS) Controlled-release 12 month fertilizer planter packets having an analysis of 20-10-5 derived from the sources listed in the following guaranteed analysis.

GUARANTEED ANALYSIS
Total Nitrogen (N).....20%
Available Phosphoric Acid (P2 O5).....10%
Derived from calcium phosphate
Soluble Potash (K2 O).....5%
Iron (expressed as elemental Fe).....(.9)% (derived from ferrous sulfate)

.2 Organic Soil Amendment: Shall be Custom Amendment Mix (WCP33) as available from Earthworks at (951) 782-0260 or approved equal. Material containing pine, or other materials will not be accepted. Provide a 1 pound sample to the Landscape Architect for approval.
.3 Organic Fertilizer shall consist of Establish as available from Earthworks at (951) 782-0260 or approved equal.

2.2 PLANTS:

.1 All plants shall be true to name, and one of each bundle or lot shall be tagged with the name and size of plants in accordance with the standards of practice recommended by the American Association of Nurserymen. The root condition of plants furnished in containers shall be determined by removal of earth from the roots of not less than two plants nor more than 2% of the total number of plants of each species or variety except when containergrown plants are from several different sources: in which case, the roots of not less than two plants of each species or variety from each source shall be checked by the Client Representative at his option. The selection of plants to be checked will be made by the Client Representative. All plants rendered unsuitable for planting shall be considered as samples, and replacements shall be provided at no additional cost. In case the sample plants are found to be defective, the entire lot or lots of plants represented by the defective samples will be rejected.
.2 All shrubs supplied by Contractor shall be of the specified standard height and diameter set by the American Standard for Nursery Stock.
.3 As soon as the work contract has been executed between the Client and the Contractor, Contractor shall immediately make arrangements for ordering all plant materials. Some of the plant materials will require additional lead time in order to arrive on site to meet any required schedules.

2.3 BACKFILL MATERIAL:

.1 Topsoil shall be free of noxious weed seeds and shall be of a loam characteristic, fertile and friable.

.2 Organic amendments shall consist of Custom Amendment Mix (WCP33) as available from Earthworks at (951) 782-0260 or approved equal. Provide a 1-pound sample to the Landscape Architect for approval.
.3 Soil used for backfill of planting pits shall be enriched using the following blend per cubic yard:
70% site soil, 30% Custom Amendment Mix (WCP33)
Fertilizers as recommended by the soils testing results

3.1 LANDSCAPE GRADING:

.1 The Contractor shall complete preliminary grading as indicated on the plans, removing existing soil and filling as needed bringing all areas to be landscaped within .1 foot of finish grade after amending. Soil displaced during planting shall be removed from site if leaving it would impact the finish grade depths.

3.2 SOIL PREPARATION:

.1 All fine grading and all weed control measures shall be completed prior to soil preparation.
.2 All landscape areas shall be finish graded to dress out maintain, and/or reestablish grades and flow lines as approved prior to amending the soil. Finish grades will be inspected upon completion. Contractor shall not proceed with planting work until finish grades have been inspected and accepted by the Client's Representative.
.3 Unless otherwise indicated on the plans or per soils test, all lawn and flatted ground cover areas shall receive 4 cu. Yards of Custom Amendment Mix (WCP33) and 90 lbs. of Establish per 1000 s.f. rototilled into the top six inches of soil in two directions. WCP33 and Establish available thru Earthworks. (951) 782-0262

3.3 WEED CONTROL MEASURES:

.1 Existing grass and weeds shall be killed with a contact herbicide. Once dead, remove all existing grass and roots and weeds from the site prior to new planting. Pre-germinate all weeds by overhead watering for minimum of once a day for one week. After complete germination-spray with a contact herbicide and remove dead weeds/roots in all planting beds. Root systems shall be removed as needed to guarantee the plant material will not grow back.
.2 After planting, prior to any decomposed granite, stone or wood mulch placement, treat all planter areas with a pre-emergent herbicide. If pre-emergent herbicide is not applied prior to the mulch placement, mulch shall be removed, the herbicide applied and the mulch reinstalled.
.3 Any chemicals applied shall be as directed by a licensed Pest Control Agent. This treatment shall be applied at the times recommended by the manufacturer. The Client's Representative shall be given a minimum of 72 hours (3 working days) notice prior to each application. No chemicals shall be applied other than in the presence of the inspector.

3.4 FINISH GRADING:

.1 After completion of all weed removal/soil preparation work the Contractor shall finish grade all planting areas filling as needed or removing surplus dirt, removing rocks and debris over 1 inch in diameter, and floating to a smooth uniform grade. All areas shall slope to drain. Flow lines shall be established to existing drain inlets or swales as shown on the grading plans and as directed by the Client's Representative.
.2 When conditions detrimental to plant growth are encountered, such as rubble fill, natural rocky conditions or adverse drainage conditions, notify the Architect and Landscape Architect before planting.

3.5 PLANTING:

.1 Trees and Shrubs: The location of each plant is as shown and may be scaled from the plan unless the Landscape Architect designates otherwise. Maintain a distance from all hardscape elements and ground covers of one-half of the spacing indicated in the planting legend or 1/2 the scaled diameter of the shrub.
.2 Plant holes shall be dug to size as indicated in the drawings. Before trees or shrubs are set in the holes, a water test should be made as follows:

.1 All plant holes shall be filled to the brim with water and allowed to drain before any planting is done. If water does not drain out of hole within 24 hours, this fact must be brought to the attention of the Client's Representative so that corrections can be made. Correctional work shall be considered as an extra, at additional expense.
.2 Soil surrounding planting pit shall be in a friable condition and moist to a depth of 8". Distribute backfill uniformly throughout the entire depth of the plant hole without clods or lumps. After the planting holes have been backfilled, jet water into the backfill with a pipe or tube inserted into the bottom of the hole until the backfill material is saturated for the full depth. If the backfill material settles below this level, add additional backfill to the required level. If a plant settles deeper than shown, replant it at the required level.
.3 Backfill using specified soil mix to within 6" of finish grade. At this depth, place the plant fertilizer packs as specified on the drawings. Refer to plans for packet quantities. Complete backfilling to finish grade.
.4 Where shrubs and groundcovers are shown to be planted in groups, the outer rows directly adjacent to the nearest roadway or highway fence must be parallel to the nearest roadway or highway fence. Stagger shrubs and groundcovers in adjacent rows. Adjust the alignment of the plants within the outer rows.
.5 Where a vine is to be planted against a wall or fence, plant it as close as possible to the wall or fence. If a vine planted next to a wall is to be staked, stake and tie the vine at the time of planting. A vine planted next to a fence must be tied to the fence at the time of planting.

3.6 MULCHES:

.1 Mulches shall be as specified on the plans. Provide a 2-pound sample of each variety to the Landscape Architect for approval prior to installation if it differs from what is specified on the plans.
.2 All mulched areas are to be treated with a pre-emergent chemical prior to the installation of the stone mulches (see 3.3.2).
.3 Following planting, shrub areas shall be re-graded to restore smooth finish grade and to ensure proper surface drainage. Watering shall begin immediately following mulching or as needed during operations to sustain the plant materials.
.4 Decomposed granite mulches to be rolled and compacted as recommended by the manufacturer after installation.
.5 After planting, any areas showing erosion shall have an approved erosion control matting installed as needed. Matting shall be equal to Western Excelcior "C-44". Provide samples to the Landscape Architect for approval. Install per manufacturer's recommendations.
.6 When necessary to prevent plant damage from pedestrian traffic during the initial growing stage, the Contractor shall erect temporary protective fencing to be removed at the end of the plant establishment period.

3.7 WATERING:

.1 It shall be the Contractor's responsibility to maintain a balanced watering program to ensure proper growth until final acceptance of the work.
.2 Immediately after planting apply water to each individual shrub. Apply water in a moderate stream in the planting hole until the material around the roots is completely saturated from the bottom of the hole to the top of the ground.
.3 Apply water in sufficient quantities and as often as seasonal conditions require, to keep the planted areas moist at all times, well below the root system of plants.
.4 Irrigation:

.1 Contractor shall properly maintain the irrigation system. A balanced water program shall be maintained to ensure proper growth until final acceptance of the work. Plants which cannot be watered efficiently with the irrigation system shall be watered with a hose.
.2 All controllers are to have each station individually adjusted on a minimum of a weekly basis. System shall be set considering the application rate each area is capable of receiving. The irrigation system shall operate on short intervals, with the cycle repeating at a later time to reduce runoff.

3.8 MAINTENANCE:

.1 All areas landscaped by Contractor under this contract shall be maintained by him for a minimum plant establishment period of not less than forty-five (45) days from the date of written acceptance for start of the plant establishment period.
.2 Areas sodded or seeded after October 1st will be accepted the following spring, approximately one (1) month after the start of growing season, May 1st or as determined by the Architect.

3.9 START OF PLANT ESTABLISHMENT:

.1 Criteria for start of plant establishment period:

.1 The plant establishment period shall not start until all elements of the project that impact the landscape are completed in accordance with the contract documents.
.2 Permanent power to the controller shall be established.
.3 The plant establishment period for the project shall not begin until the Project Inspector has approved the installation of all materials.
.4 Written acceptance by the Client's Representative must be obtained prior to the start of the plant establishment period.
.5 If the project maintenance fails to continuously meet standards required, the plant establishment period day count will be suspend and will not recommence until Contractor has corrected all deficiencies.

3.10 MAINTENANCE TASKS:

.1 General:
.1 During the contract period provide all watering, weeding, fertilizing and cultivation, and spraying necessary to keep the plants in a healthy growing condition and to keep the planted areas neat, edged, and attractive. All plants planted under the contract shall be pinched and pruned as necessary to encourage new growth and to eliminate sucker growth.

.2 Iron Chlorosis:

.1 After planting and during the plant establishment period in the event that plants exhibit iron chlorosis symptoms, apply FE 138Geigy or equivalent at manufacturers recommended rates.

.3 Replacement Plantings:

.1 During the plant establishment period, should the appearance of any plant indicate weakness, that plant shall be replaced immediately with a new, healthy plant. At the end of the plant establishment period, all plant materials shall be in a healthy, growing condition and spaced as indicated on the plans.

.4 Planting Establishment:

.1 Any planting areas that do not show a prompt establishment of plant material shall be replanted at 10 day intervals until the plant material is established. If a good rate of growth has not been demonstrated within 30 days of first planting, the Contractor shall be responsible to determine the appropriate horticultural practices necessary to obtain good growth. The Contractor shall obtain agronomic soils testing, at their cost, of all areas not showing good growth and shall provide copies of the test results to the Client to verify the appropriateness of all maintenance work performed. If additional soil amendments or fertilizers are needed, up to a maximum 30% beyond the amount specified, such amendments shall be provided by the Contractor at no additional cost to the Client.

.5 Grading And Drainage:

.1 During the plant establishment period all flow lines shall be maintained to allow for free flow of surface water. Displaced material which interferes with drainage shall be removed and placed as directed. Low spots and pockets shall be graded to drain properly. Erosion control netting shall be installed at flow lines and other locations where erosion is evident at no additional cost to the Client, when directed by the Project Inspector.

.6 General Conditions:

.1 Damage to planting areas shall be repaired immediately and throughout the plant establishment period. Depressions caused by vehicles, bicycles, or foot traffic shall be filled and leveled. Replant damaged areas.
.2 All paved areas shall be cleaned and maintained in a neat and clean condition at all times.
.3 Any subsurface drains with the project area shall be periodically flushed with clear water to avoid build up of silt and debris. Keep all drain inlets clear of leaves, trash, and other debris.
.4 Throughout the plant establishment period, all plants shall be maintained in a disease and pest free condition at the Contractor's expense. A licensed pest control operator shall be retained by the Contractor to recommend and apply all pesticides, herbicides, and fungicides. Exterminate gophers, moles, and all other rodents, and repair damage as soon as evidence of rodent activity is noticed.
.5 Debris and trash shall be removed from the site daily at a minimum.

3.11 EXISTING TREE CARE PRUNING:

.1 Contractor shall have all existing trees evaluated and pruned by an I.S.A. Board Certified Arborist per 'ANSI a330 part1, Pruning', published by the Tree Care Industry Association. Pruning shall remove dead branches, crossing branches and minor 'lacing' of the tree canopies. Pollarding of trees is not permitted. Arborist shall meet with the Project Representative prior to any pruning work done to discuss the level of pruning required. One tree of each species shall be pruned for approval and to provide a representation of the pruning to be accomplished on all trees. Pruning shall be accomplished after utilities installation and fine grading but prior plant installation.

.2 All trenching for sprinklers, electrical, or other predominant features should be carefully considered to limit the affect upon the trees. Trenches should be laid out wherever possible to run in lines radiating out from the trunks of adjacent trees as opposed to lines perpendicular to those lines radiating from the trunks. Any necessary trenching within the drip lines shall be done by hand to allow for cutting of any uncovered roots. Wherever possible, trenches could be dug under large roots that are found above the necessary depth of the trenches leaving viable root tissues in place wherever possible. Root ends should be cut smoothly by means of loppers or hand saws. Root pruning shall be followed within 24 hours by a soil drench which includes ROOTSTM concentrate, and Dyna-GrOTM 'Grow 7-9-5' or equivalent hydroponically balanced mineral concentrate. ROOTSTM concentrate is to be diluted 50:1 (2 oz. per gal.) and then applied at the rate of 1 gallon (i.e., 2 oz. of concentrate.) per caliper-inch of trunk diameter. If Dyna_GrOTM is the mineral additive used, it can be included with the ROOTSTM solution, in a 750:1 dilution (1 tsp. per gal.). Application shall be made in the presence of the Client's Representative. No roots 1-inch or larger are to be cut without the approval of the owner's representative. See Irrigation Specifications.

.3 All personnel on the site shall abide by the following specifications to avoid damage to the trees:

.1 No vehicles shall be parked or driven within any zone of protection.
.2 No materials shall be stacked within any zone of protection. All staging areas shall be at a distance of 10 feet or more beyond any tree canopy.
.3 No concrete slurry, paints or any other liquid construction wastes shall be poured upon the soil surface within 20 feet of any tree. All construction wastes should be disposed of offsite.
.4 No objects shall be fastened to or hung from trees, except as needed in the course of pruning or other tree maintenance work.
.5 No excavation, trenching or grade changes shall be effected within any zone of protection, except as approved by the Arborist, in collaboration with appropriate agents such as engineers or representatives of the general contractor, the Client, etc.
.6 No heavy equipment shall be operated in a manner to produce physical impact with any visible part of any tree designated for preservation.
.7 No branch removal or clearance pruning of any kind shall be performed except as prescribed or approved by the arborist.
.8 Any construction related damage to trees observed by the Client's Representative shall be reported in writing, with assessment of the dollar value of the damage and recommended indemnification and/or corrective action, the report to be presented to appropriate representatives of the general contractor and the Client.

3.12 DEBRIS REMOVAL:

1. Contractor shall remove all trash, weeds and plant debris within the project area and recycle or dispose of in a legal manner prior to applying any stone or wood mulches.

3.13 END OF PLANT ESTABLISHMENT PERIOD:

.1 When the Contractor believes he has completed the plant establishment period and the entire project is ready for final acceptance, he shall request inspection of the project. The Client's Representative will inspect the project for final acceptance. Deficiencies noted during inspection shall extend the plant establishment period until all are corrected.
.2 All planting areas shall show a good rate of growth and shall be well established filled in plantings free of voids. Bare areas will be unacceptable.
.3 Final Acceptance shall occur only upon written acceptance of the project for maintenance by the Client's authorized representative.

3.14 CLEAN UP:

.1 Upon completion of each phase the work, the Contractor shall smooth all ground surfaces; remove excess materials, rubbish, debris, etc.; sweep adjacent streets, curbs, gutters, walkways, and remove construction equipment from the premises.

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REGISTERED LANDSCAPE ARCHITECT
SHAWN T. BURGESS
10/26
RENEWAL
7/21/25
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WASTE WATER TREATMENT PLANT
HILLSIDE STABILIZATION & STAIRWAY IMPROVEMENT PLANS

PLANTING SPECIFICATIONS

BENCHMARK

THE BENCHMARK FOR THIS SURVEY IS A SPIKE AND WASHER SET IN ASPHALT DRIVE 27'± WEST OF NORTHEASTERLY CHAIN LINK FENCE OF SITE AND 17'± NORTH OF NORTHEAST CORNER OF MOST EASTERLY SLUDGE BEDS.

ELEVATION: 1174.00 FEET (NAVD 88)

Letter	Description	Date	Initial	Initial
1	REVISE SHEET NUMBERING: 8/11/25			

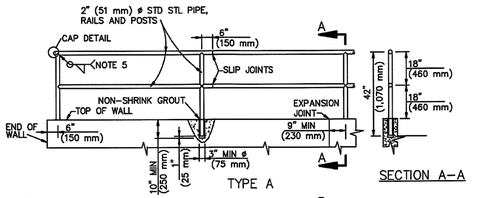
Revisions

Checked by: Date:
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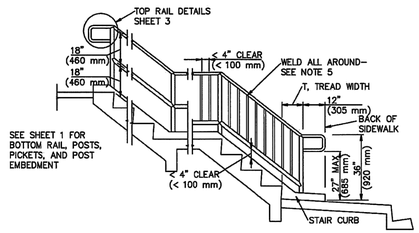
REVIEWED BY: DATE 7/18/2025
Gerard J. Nepomuceno, Civil Engineer RCE #93200
APPROVED BY: DATE 7/18/2025
Goutam K. Dubey, City Engineer RCE #75648

SHEET 8 OF 9 SHEETS

2475-PG/08/09



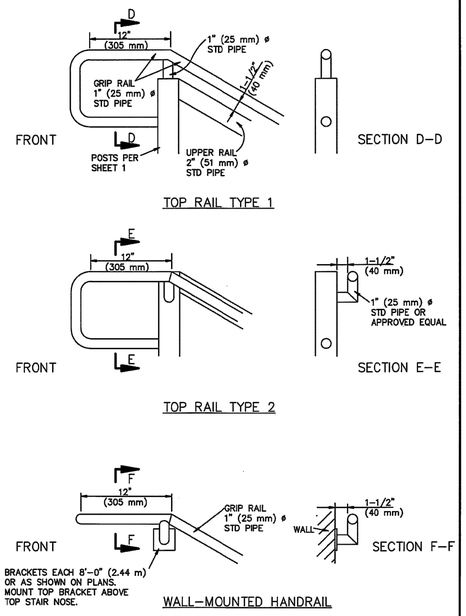
STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION		
PROMULGATED BY THE PUBLIC WORKS STANDARDS INC. GREENBOOK COMMITTEE 1953 REV. 1996, 2000, 2005, 2010	**METAL HAND RAILINGS**	STANDARD PLAN **606–4**
	USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION	SHEET 1 OF 3



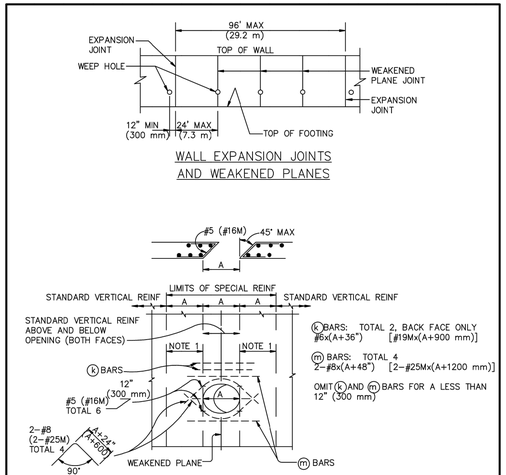
NOTES:

1. USE TYPE C WHERE ADJACENT GRADE IS MORE THAN 2'–6" (760 mm) BELOW LANDING OR SIDEWALK FINISHED SURFACE.
2. RAILS, POSTS, AND PICKETS SHALL BE GALVANIZED STEEL PIPE.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION		
	METAL HAND RAILINGS	STANDARD PLAN **606–4**
		SHEET 2 OF 3



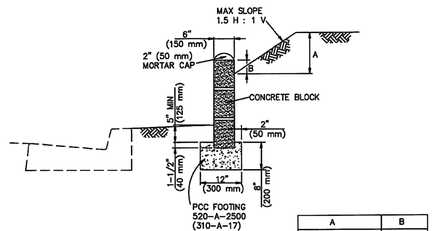
STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION		
	METAL HAND RAILINGS	STANDARD PLAN **606–4**
		SHEET 3 OF 3



NOTES:

1. STANDARD VERTICAL REINFORCEMENT PLUS ADDITIONAL VERTICAL BARS MATCHING SIZE AND NUMBER OF BARS CUT BY THE OPENING. PLACE HALF ON EACH SIDE. EXTEND THE ADDITIONAL BARS INTO THE FOOTING THE SAME AS THE OTHER VERTICAL WALL REINFORCEMENT AND TO A MINIMUM OF 60 BAR DIAMETERS ABOVE THE TOP OF UTILITY OPENING IF WALL HEIGHT PERMITS. BUNDLE BARS AS REQUIRED.
2. HORIZONTAL REINFORCEMENT IS STANDARD EXCEPT AS SHOWN.
3. ALL REINFORCEMENT SHALL CLEAR OPENING BY 2" (50 mm) MIN.
4. ADJUST EXPANSION JOINT LOCATIONS TO FALL OUTSIDE THE LIMITS OF SPECIAL REINFORCING.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION		
	REINFORCED CONCRETE RETAINING WALL DETAILS	STANDARD PLAN **617–3**
		SHEET 3 OF 8

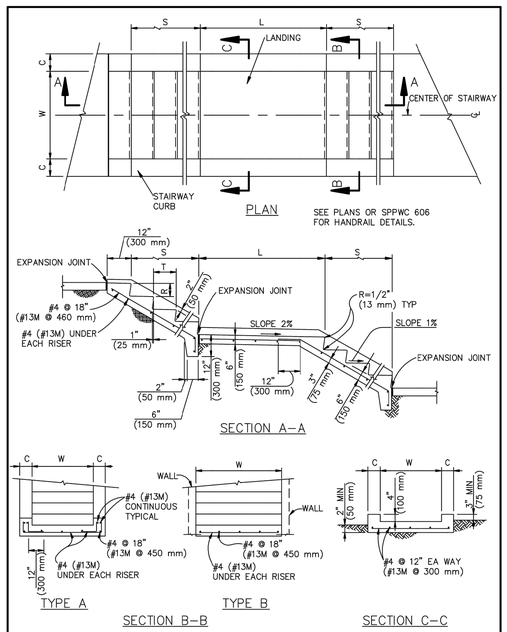


A	B
0 TO 6" (0 TO 150 mm)	2" (50 mm)
6" TO 16" (151 TO 400 mm)	4" (100 mm)
17" TO 48" (410 TO 1200 mm)	6" (150 mm)

NOTES

1. MAX HEIGHT OF WALL IS 3 COURSES OF 8" (200 mm) HIGH BLOCK.
2. NO LIVE–LOAD SURCHARGE SHALL BE ALLOWED ON RETAINED SOIL.
3. POUR FOOTING AGAINST UNDISTURBED EARTH.
4. TOP OF FOOTING MAY BE PLACED AT SAME GRADE AS STREET IF STREET GRADE IS UNIFORM AND 5% MAX.
5. PLACE CONCRETE BLOCKS IMMEDIATELY AFTER POURING THE FOOTING. FILL ALL CELLS SOLID WITH GROUT AND ROD SO THAT GROUT IS MONOLITHIC WITH FOOTING.
6. IN FIRST COURSE ABOVE FINISHED GRADE, OMIT MORTAR FROM VERTICAL JOINTS EACH 32" (800 mm) TO SERVE AS WEEP HOLES.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION		
PROMULGATED BY THE PUBLIC WORKS STANDARDS INC. GREENBOOK COMMITTEE 1953 REV. 1996, 2000, 2005, 2010	**CONCRETE BLOCK SLOUGH WALL**	STANDARD PLAN **622–4**
	USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION	SHEET 1 OF 1



STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION		
PROMULGATED BY THE PUBLIC WORKS STANDARDS INC. GREENBOOK COMMITTEE 1953 REV. 1996, 2005, 2009	**REINFORCED CONCRETE STAIRWAY**	STANDARD PLAN **640–3**
	USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION	SHEET 1 OF 2

NOTES:

1. SEE THE PLANS FOR THE FOLLOWING INFORMATION:
   TYPE OF STAIRWAY AND LOCATION
   W = WIDTH OF STAIRWAY
   L = LENGTH OF LANDINGS
   T = LENGTH OF TREAD
   R = HEIGHT OF RISER
   C = WIDTH OF CURB
   S = LENGTH OF STAIRWAY FLIGHT
2. CONCRETE FINISH FOR EXPOSED SURFACES SHALL BE CLASS I, EXCEPT THAT TREADS AND LANDINGS SHALL BE TROWELLED SMOOTH AND GIVEN A FINE BROOM FINISH IN A DIRECTION PERPENDICULAR TO THE CENTERLINE OF THE STAIRWAY. THE BROOM FINISH SHALL BE BROUGHT TO THE NOSE OF THE TREADS AND LANDINGS.
3. ONE HANDRAIL IS REQUIRED FOR STAIRWAYS 4' (1.22 m) WIDE OR LESS. TWO HANDRAILS ARE REQUIRED FOR WIDER STAIRWAYS.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION		
	REINFORCED CONCRETE STAIRWAY	STANDARD PLAN **640–3**
		SHEET 2 OF 2

CONSTRUCTION NOTES

1. CONSTRUCT RETAINING WALL PER DETAIL ON SHEET 3 – TYPE PER PLAN (REQUIRES SEPARATE PERMIT THROUGH BUILDING AND SAFETY)
2. CONSTRUCT V–DITCH PER DETAIL ON SHEET 3
3. CONSTRUCT U–CHANNEL PER DETAIL ON SHEET 3
4. CONSTRUCT GRATE INLETS PER DETAIL ON SHEET 3
5. CONSTRUCT CONCRETE BLOCK SLOUGH WALL PER SPPWC STD. 622–4 ON SHEET 9
6. CONSTRUCT REINFORCED CONCRETE STAIRWAY TYPE A PER SPPWC STD. 640–4 ON SHEET 9
7. CONSTRUCT METAL HAND RAILINGS PER SPPWC STD. 606–4
8. INSTALL LIGHT STANDARD PER LANDSCAPE ARCHITECT'S PLAN SHEET 4 & LIGHT POLE FOOTING DETAIL ON SHEET 3
9. CONSTRUCT 4" THICK CONCRETE SLAB W/#3 BARS @ 24"O.C.E.W. & #3 CONT. BAR AT EDGE
10. PROTECT IN PLACE ITEM AS NOTED
11. CONSTRUCT V–DRAIN PER DETAIL ON SHEET 3
12. REMOVE AND DISPOSE OF EXISTING V–DRAIN
13. CONSTRUCT RETAINING WALL UTILITY OPENING PER SPPWC STD. 617–3 ON SHEET 9
14. REMOVE AND REPLACE EXISTING V–DRAIN AS–NEEDED TO CONSTRUCT WALL FOOTING

Hicks & Hartwick, Inc.
37 East Olive Ave. Ste C
Redlands, CA. 92373
909.793.2257

R.C.E. No. 63494 Date: 7/18/2025

REGISTERED PROFESSIONAL ENGINEER MATTHEW C. HICKS No. 63494 CIVIL STATE OF CALIFORNIA

CITY BUSINESS TAX # 0385500
EXPIRES: 12/31/2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

WASTEWATER TREATMENT PLANT HILLSIDE STABILIZATION & STAIRWAY IMPROVEMENT PLANS

DETAIL SHEET

2475-PG-09/09

BENCHMARK

THE BENCHMARK FOR THIS SURVEY IS A SPIKE AND WASHER SET IN ASPHALT DRIVE 27'± WEST OF NORTHEASTERLY CHAIN LINK FENCE OF SITE AND 17'± NORTH OF NORTHEAST CORNER OF MOST EASTERLY SLUDGE BEDS.

ELEVATION: 1174.00 FEET (NAVD 88)

Letter	Description	Date	Initial	Initial
1	ADDED SHEET 9, REVISE SHEET NUMBERING AND CONSTRUCTION NOTES.			

Revisions

Checked by: _____ Date: _____
Checked by: _____ Date: _____
Checked by: _____ Date: _____
Checked by: _____ Date: _____

REVIEWED BY: DATE 7/18/2025
Gerard J. Nepomuceno, Civil Engineer RCE #93200
APPROVED BY: DATE 7/18/2025
Goutam K. Dobey, City Engineer RCE #75646

SHEET 9 OF 9 SHEETS

\\TI\acadata_10000_\10383 Redlands On-Call_WWTP Slope\h_GRADE\ 10383GM09_DETAILS.dwg 2:32pm – Aug 12, 2025

CITY OF REDLANDS
MUNICIPAL UTILITIES & ENGINEERING DEPARTMENT

Bid Proposal, Contract Documents and Specifications

For

WWTP Hillside Stabilization and Stairway Improvements Project
Project No. 521038

RECYCLED PAPER

JULY 2025

CITY OF REDLANDS

MUNICIPAL UTILITIES & ENGINEERING DEPARTMENT

Bid Proposal, Contract Documents and Specifications

for

WWTP Hillside Stabilization and Stairway Improvements Project
Project No. 521038

For use in conjunction with specifications entitled: "Standard Specifications for Public Works Construction (Greenbook)" 2021 Edition; "Standard Plans for Public Works Construction" 2021 Edition; Municipal Utilities and Engineering Department's Water Systems Standard Specifications and Sanitary Sewer System Standard Specifications, latest editions; and General Permit Conditions and Trench Specifications.

City Council:
Mario Saucedo, Mayor
Marc Shaw, Mayor Pro Tem
Paul Barich, Councilmember
Eddie Tejeda, Councilmember
Denise Davis, Councilmember

City Clerk:
Jeanne Donaldson, City Clerk

City Staff:
Charles M. Duggan Jr., City Manager

JULY 2025

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WWTP Hillside Stabilization and Stairway Improvements Project
Project No. 521038

TABLE OF CONTENTS

(XX) REFLECTS PAGE IDENTIFICATION FOOTER ABBREVIATION

NOTICE INVITING SEALED PROPOSALS (NIB)

BID DOCUMENTS (BD)

INSTRUCTIONS TO BIDDERS 1
PROPOSAL 10
BID CERTIFICATION 14
BID BOND 15
NON-COLLUSION AFFIDAVIT 16
STATEMENT BY BIDDER 17
OFFICERS OF CORPORATION (Members of Firm) 17
SUB-CONTRACTORS LIST 18
QUALIFICATION AND EXPERIENCE STATEMENT 19
GENERAL INFORMATION 20

CONTRACT DOCUMENTS (CD)

PUBLIC WORKS CONSTRUCTION CONTRACT 2

GENERAL CONDITIONS (GC)

SECTION 1 – GENERAL, TERMS, DEFINITIONS, ABBREVIATIONS, UNITS OF MEASURE, AND SYMBOLS 1
SECTION 2 - SCOPE OF THE WORK 2
SECTION 3 - CONTROL OF THE WORK 3
SECTION 4 - CONTROL OF MATERIALS 7
SECTION 5 – LEGAL RELATIONS AND RESPONSIBILITES 8
SECTION 6 – PROSECUTION AND PROGRESS OF THE WORK 30
SECTION 7 - MEASUREMENT AND PAYMENT 32
SECTION 8 - FACILITIES FOR AGENCY PERSONNEL 33
SECTION 9 - ASSIGNMENT OF UNFAIR BUSINESS PRACTICES CLAIMS 33
SECTION 10 - TRENCHING AND EXCAVATION 33
SECTION 11 - REMOVAL, RELOCATION OR PROTECTION OF EXISTING UTILITIES 34
SECTION 200 - ROCK MATERIALS 35
SECTION 201 - CONCRETE, MORTAR AND RELATED MATERIALS 36

SECTION 203 - BITUMINOUS MATERIALS 36
SECTION 206 - MISCELLANEOUS METAL ITEMS 37
SECTION 207 – GRAVITY PIPE 38
SECTION 211 - MATERIAL TESTS 38
SECTION 214 - TRAFFIC STRIPING, CURB AND PAVEMENT MARKINGS, AND PAVEMENT MARKERS 38
SECTION 300 - EARTHWORK 39
SECTION 301 - TREATED SOIL, SUBGRADE PREPARATION AND PLACEMENT OF BASE MATERIALS 43
SECTION 302 - ROADWAY SURFACING 48
SECTION 303 - CONCRETE AND MASONRY CONSTRUCTION 58
SECTION 304 - METAL FABRICATION AND CONSTRUCTION 61
SECTION 314 - TRAFFIC STRIPING, CURB AND PAVEMENT MARKINGS, AND PAVEMENT MARKERS 62

GENERAL REQUIREMENTS

SECTION 01110 COORDINATION OF WORK
SECTION 01112 DESCRIPTION OF WORK
SECTION 01200 MEASUREMENT AND PAYMENT
SECTION 01251 CHANGE ORDER REQUESTS
SECTION 01254 CHANGE ORDERS
SECTION 01298 SCHEDULE OF VALUES
SECTION 01321 CONSTRUCTION SCHEDULE
SECTION 01322 CONSTRUCTION PROGRESS PHOTOGRAPHY
SECTION 01323 CONSTRUCTION STATUS REPORTS
SECTION 01330 SUBMITTALS
SECTION 01571 STORMWATER POLLUTION PREVENTION PLAN
SECTION 01581 CONSTRUCTION INFORMATION SIGNS
SECTION 01721 MOBILIZATION
SECTION 01722 SURVEYING
SECTION 01732 POTHOLING
SECTION 01740 DEMOBILIZATION

TECHNICAL SPECIFICATIONS

SECTION 02222 PROTECTING EXISTING UNDERGROUND UTILITIES

APPENDIX

APPENDIX A	CHECKLIST OF LABOR LAW REQUIREMENTS
APPENDIX B	CITY OF REDLANDS WORKDAY CONSTRUCTION SCHEDULE
APPENDIX C	CITY OF REDLANDS CONTRACTOR SAFETY PROGRAM
APPENDIX D	PERMITS

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NOTICE INVITING SEALED PROPOSALS (NIB)
For
Wastewater Treatment Plant Hillside Stabilization and Stairway Improvements Project
Project No. 521038

NOTICE IS HEREBY GIVEN that the City Council of the City of Redlands invites all and will receive sealed Proposals (Bids) at the office of the City Clerk, City of Redlands, 35 Cajon Street, Suite 4, Redlands, CA 92373, on **August 14, 2025**, up to the hour of **2:00 p.m.,** at which time they will be opened and publicly read. Bids shall be marked: **BID FOR: Wastewater Treatment Plant Hillside Stabilization and Stairway Improvements Project, Project No. 521038.**

The City Council of the City of Redlands reserves the right to reject any and all Bids, to waive any irregularity, and award contracts in the best interests of the City.

The City of Redlands utilizes PlanetBids, a web based bid management service to manage request for bids. PlanetBids does not charge a fee to access and view current project 'Request for Bids"; however, they require potential contractors, subcontractors and suppliers to provide contact information in order to download files, receive addendum notifications and to receive automatic updates or revisions to projects. PlanetBids can be accessed through the City of Redlands website at http://www.cityofredlands.org/RFP.

Proposals (Bids) shall be executed on the separately bound forms included within the "Bid Submittal Package" in accordance with the instructions contained therein.

Bid security, in the form of a cashier's check, a certified check made to the order of the City of Redlands, or a Bidder's Bond, and in an amount not less than ten percent (10%) of the amount of the Bid is required to be submitted with each Bid. Said check or bond shall be given as a guarantee that the bidder will enter into contract with the City of Redlands if awarded the work, and will be declared forfeited if the selected bidder fails to enter into contract within fourteen (14) days after Notice of Award.

The Bidder to whom award is made will be required to furnish a Labor and Material Bond and a Faithful Performance Bond each in an amount of 100% of the Bid amount, from surety company satisfactory to the City of Redlands.

Pursuant to CA Labor Code Section 1770 et seq., the successful bidder shall pay not less than the prevailing rate of per diem wages as determined by the Director of the California Department of Industrial Relations. Copies of such prevailing rate of per diem wages are available at http://www.dir.ca.gov/OPRL/PWD/. Copies of the prevailing wage determination are also on file at the City of Redlands and shall be made available to any interested party upon request.

Pursuant to provisions of Section 22300 of the California Public Contract Code, the Contractor may substitute securities for any monies withheld by the City to ensure performance of the work.

Pursuant to the provisions of Section 3300 of the California Public Contract Code, Bidders shall be licensed as "Class A" and provide their California State Contractor's License numbers to the City. In addition, no contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)]. No contractor or subcontractor may be awarded a contract for public work on a public works project (awarded on or after April 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5. This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

All terms and conditions contained in the Contract Documents including the Instructions to Bidders shall become a part of the Contract. No Bidder may withdraw their Bid for a period of sixty (60) days after the time of Bid Opening.

All questions related to this project shall be directed to Goutam Dobey, Project Manager, at 909-798-7584 Ext 2. It shall be understood, however, that no specification interpretations will be made by telephone, nor will any products be considered for approval prior to award of the Contract. Changes, if any, will be made by addendum prior to opening of Bids.

BY ORDER OF THE CITY COUNCIL OF THE CITY OF REDLANDS, SAN BERNARDINO COUNTY, CALIFORNIA.

Dated this 24th day of July 2025

Jeanne Donaldson, City Clerk,
City of Redlands
San Bernardino County, California

BID DOCUMENTS
(BD)

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INSTRUCTIONS TO BIDDERS
For
WWTP Hillside Stabilization and Stairway Improvements Project
Project No. 521038

Bids to receive consideration shall be made in accordance with the following instructions:

1. PROPOSALS:

a. Bids shall be made upon the form of proposal furnished by the City. All Bids shall be properly executed with all items filled in; the signatures of all persons signing shall be in longhand. If the unit price and the total amount named by a Bidder for any item are not in agreement, the unit price shall be considered as representing the Bidder's intention, and the totals may be corrected by the Engineer to conform thereto. If the sum of the individual bid item's and the total amount named by a Bidder are not in agreement, the sum of the bid item's shall be considered as representing the Bidder's intention, and the totals may be corrected by the Engineer to conform thereto. If the total price written in words and the total price written in figures are not in agreement, then the total price written in words will be considered as representing the Bidder's intention, and the totals will be corrected by the Engineer to conform thereto.

b. Proposals may be rejected if they show any alterations of form, additions not called for, conditional or alternative bids, incomplete Bids, erasures, or irregularities of any kind. Mistakes shall be lined through and the correct amount written above and initialed by the authorized agent of the Bidder.

c. Bids shall be accompanied by a cashier's or a certified check or Bidder's admitted corporate surety bond, in an amount not less than ten percent (10%) of the bid, made payable to the City of Redlands. Said check or bond shall be given as a guarantee that the Bidder will enter into a contract if awarded the work. In the case of refusal or failure to enter into said Contract, within fourteen (14) days after Notice of Award by the City in writing, the security shall be applied by the City to the difference between such bid and next lowest acceptable bid and surplus, if any, shall be returned to Bidder if cash or check is used, or to Surety if bid bond is used.

d. Before submitting a bid, Bidders shall carefully examine the Plans; read the Specifications; read all other Contract documents; shall visit the site of the work; shall fully inform themselves as to all existing conditions and limitations; and include in the bid a sum to cover the cost of all items included in the Contract. No allowance will be made due to lack of examination or knowledge. The submission of a bid shall be conclusive evidence that the bidder has investigated and is satisfied as to the conditions to be encountered as to character, quality and scope of work to be performed; the quantities of materials to be furnished; and as to the requirements of the Bid Proposal, plans and specifications.

e. Pursuant to CA Labor Code Section 1770 et seq., the successful bidder shall pay not less than the prevailing rate of per diem wages as determined by the Director of the California Department of Industrial Relations. Copies of such prevailing rate of per diem wages are available at http://www.dir.ca.gov/OPRL/PWD/. Copies of the prevailing wage determination are also on file at the City of Redlands and shall be made available to any interested party upon request.

f. The bid must be submitted on or before the date and time specified in the Notice Inviting Sealed Proposals (Bids). The bid shall be submitted in a sealed envelope marked in the lower left corner as follows:

BID FOR: WWTP Hillside Stabilization and Stairway Improvements Project, Project No. 521038

g. Bids will be opened and publicly read aloud at the time set in the Notice Inviting Sealed Proposals (Bids), in the Office of the City Clerk, Civic Center, 35 Cajon Street, Suite 4, Redlands, California.

2. AGREEMENT AND BONDS:

The form of Contract which the successful Bidder, as Contractor, will be required to execute is included in the Contract Documents (CD) of these specifications and should be carefully examined by the Bidder. The Agreement, admitted Corporate Surety Bonds and other documents to be executed by the Contractor shall be executed in original-duplicates stamped according to law, one of which original-duplicates shall be filed with the City Clerk of the City of Redlands. The successful Bidder, simultaneously with the execution of the Agreement, will be required to furnish a faithful performance bond and a labor and material bond, each in an amount equal to one hundred percent (100%) of the Contract price. Said bonds shall provide that if the Contractor or their Subcontractor fails to pay for any materials, provision, provender or other supplies or items used in, upon, for or about the performance of the work contracted to be done, or for any work of labor thereon of any kind, or for amounts due under the Unemployment Insurance Act or Workman's Compensation, with respect to such work or labor, that the surety or sureties will pay for the same. The amount shall not exceed the sum specified in the bond, and also, in case suit is brought upon the bond, a reasonable attorney's fee to be fixed by the court. All bonds shall be secured from surety companies satisfactory to the City of Redlands and whose name is on file with the County Clerk of San Bernardino County, as an approved and financially sound surety company authorized to transact business in this state.

3. WITHDRAWAL OF BIDS:

a. Any Bidder may withdraw his Bid, only by written request, at any time prior to the scheduled time for Bid Opening.

b. No Bidder may withdraw his Bid for a period of sixty (60) days after the time of Bid Opening except as allowed by the California Public Contract Code.

4. INSURANCE AND HOLD HARMLESS REQUIREMENTS:

Before entering into a Contract, the Bidder to whom the Contract has been awarded shall furnish satisfactory evidence that they have secured all required insurance from a responsible insurance company authorized to do business in California and satisfactory to the City, and such insurance shall be maintained in full force and effect at the Contractor's own expense during the life of the Contract. Contractor shall furnish the City with the customary Certificates of Insurance for all required insurance listed below. General Liability Insurance shall name the City and the Consultant, as an additional insured and shall be primary and non-contributing to any insurance or self-insurance maintained by the City. All liability insurance policies shall bear an endorsement or shall have attached a rider whereby it is provided that, in the event of expiration or proposed cancellation of such policies for any reason whatsoever, the City shall be notified by registered mail, return receipt requested, giving sufficient time before the date thereof to comply with any applicable law or statute, but in no event less than forty five (45) days before expiration or cancellation is effective.

The coverage shall provide the following minimum limits based on the type of work proposed under this Contract. The Contractor shall determine if the proposed work requires Tier 1 or Tier 2 Insurance Requirements as follows:

CONTRACTED OPERATIONS DESIGNATED AS TIER 1		
Air Conditioning (HVAC) Systems (installation)	Electric Light or Power Line Construction	Pipeline Construction
Airport Runways (paving, repaving, etc.)	Elevator Work	Roofing
Blasting Operations	Excavation	Sandblasting
Bridge or Elevated Highway Construction	Fire Suppression Systems (installation)	Sewer and Water Main Construction
Buildings Structural Work (including elevators)	Gas Mains or Connections Construction	Sign Erection (streets)
Building Structure (raising or moving)	Geophysical Exploration	Solar Energy
Cable Installation in Conduits and Conduit Construction (streets)	Grading of Land	Street Cleaning
Caisson or Cofferdam Work	Hazardous Materials Contractors	Street or Road Construction
Dam or Reservoir Construction	Irrigation or Drainage Construction	Tank Construction, Installation, Erection or Repair
Demolition (structures)	Landscape Construction (street or street medians)	Telephone or Cable Line Construction
Drilling	Painting (exterior greater than single story)	Tree Pruning, Dusting, Spraying or Removal

TIER 1 DESIGNATED INSURANCE REQUIREMENTS

a. Commercial General Liability
   - $1 Million Per Occurrence/ $2 Million Aggregate
     - City listed as an Additional Insured on the coverage
     - Coverage is primary and non-contributory
     - If scope of work is within 50 feet of any railroad, endorsement citing inclusion of liability associated with this work is required
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission

b. Business Auto Liability
   - $1 Million Combined Single Limit
     - City listed as an Additional Insured on the coverage
     - Must include liability arising from all owned, leased, hired, and non-owned autos
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission
   - If Contractor or its subcontractors or suppliers haul hazardous material (including, without limitation, waste), Auto Liability insurance must be applicable to all hazardous waste hauling vehicles, and include MCS 90 and CA9948 Endorsements.

c. Commercial Umbrella/ Excess Liability
   - $5 Million Per Occurrence/ Aggregate
     - City listed as an Additional Insured on the coverage
     - Coverage is primary and non-contributory
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission

d. Workers Compensation
   - $1 Million Per Occurrence for Bodily Injury by Accident
   - $1 Million Each Employee for Bodily Injury by Disease
   - $1 Million Policy Limit for Bodily Injury by Accident
     - Waiver of Subrogation in favor of City
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission

e. Pollution Policy (Hazardous Materials) [If Applicable]
   - Required of Projects that involve Demolition and/or Excavation Activities
   - $1 Million Per Occurrence/ $2 Million Aggregate
   - City listed as an Additional Insured on the coverage

CONTRACTED OPERATIONS DESIGNATED AS TIER 2		
Air Conditioning (HVAC) Systems (service and repair)	Carpentry (building interiors)	Fire Suppression Systems (service and repair)
Alarms and Alarm Systems	Communications Equipment Installation (interior)	Landscape Construction
Building Interior Work (service, repair and non-structural remodeling)	Driveway, Parking Area or Sidewalk (paving or repaving)	Painting (exterior)
Cable Installation in Conduits (buildings)	Fence Erection	All Other Job Types including Vendors

TIER 2 DESIGNATED INSURANCE REQUIREMENTS

a. Commercial General Liability
   - $1 Million Per Occurrence/ $2 Million Aggregate
     - City listed as an Additional Insured on the coverage
     - Coverage is primary and non-contributory
     - If scope of work is within 50 feet of any railroad, endorsement citing inclusion of liability associated with this work is required
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission

b. Business Auto Liability
   - $1 Million Combined Single Limit
     - City listed as an Additional Insured on the coverage
     - Must include liability arising from all owned, leased, hired, and non-owned autos
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   - $1 Million Per Occurrence/ $2 Million Aggregate
   - City listed as an Additional Insured on the coverage

Contractor expressly waives all rights to subrogation against the City, its officers, employees and volunteers for losses arising from work performed by Contractor for City by expressly waiving Contractor's immunity for injuries to Contractor's employees and agrees that the obligation to indemnify, defend and hold harmless provided for in this Agreement extend to any claim brought by or on behalf of any employee of Contractor. This waiver is mutually negotiated by the parties. This shall not apply to any damage resulting from the sole negligence of City, its agents and employees. To the extent any of the damages referenced herein were caused by or resulted from the concurrent negligence of City, its agents or employees, the obligations provided herein to indemnify, defend and hold harmless are valid and enforceable only to the extent of the negligence of contractor, its officers, agents and employees.

Subcontractors. The prime contractor shall include all subcontractors as insureds under its policies or shall furnish separate certificates and endorsements from each subcontractor.

The Contractor shall not assign or sublet the contract, in whole or in part, without the written consent of the City, nor shall the contractor assign any monies due to, or to become due to, Contractor hereunder without prior written consent of the City.

The Contractor shall be fully responsible to the City for the acts and omissions of the subcontractor and persons either directly or indirectly employed by the Contractor. Consent to subcontracting part of the work shall, in no way, release the Contractor from responsibility for performance of the work, and Contractor will be held, in all respects, accountable for the same as if no consent had been given. The Contractor shall give personal attention to this work which is sublet. Nothing contained in the contract documents shall create any contractual relation between any subcontractor and the City.

Hold Harmless and Indemnification. Contractor shall indemnify, hold harmless and defend City and its elected officials, agents and employees and the Consultant from and against any and all claims, losses or liability, including attorney's fees, arising from injury or death to persons or damage to property occasioned by any act, omission or failure to act of Contractor, its subcontractors, and any officers, agents and employees in performing the work required by this Agreement. Contractor's obligations under this provision shall not be limited in any way by any terms of this Agreement, or the insurance limits.

5. LICENSES AND PERMITS:

No bid will be accepted from a Contractor who is not licensed in accordance with the law under the provisions of Division III, Chapter 9 of the Business and Professions Code of the State of California.

The Contractor shall, at the time of bid opening, possess a valid "Class A" Contractor's license, and provide its California State Contractor's License number to the City.

All subcontractors listed at the time of bid opening shall possess a valid Contractor's license for the work in which they are specified to complete within the Bid Submittal Package.

The Contractor shall, prior to Notice to Proceed, procure all other permits and licenses as stipulated in the GENERAL CONDITIONS.

In addition, no contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015 or awarded on or after April 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5. Contractors shall submit proof of registration status with their bid submission to the City of Redlands. This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

6. SUBSTITUTION OF SECURITIES:

In accordance with applicable provisions of State law, the Contractor will be permitted to substitute qualified securities in lieu of retention of withheld progress payments by the Owner.

7. SUBCONTRACTORS:

Pursuant to Section 4105 of the California Public Contract Code, the bidder may not circumvent the requirement to list subcontractors by the device of listing one subcontractor, who in turn sublets portions constituting a majority of the work covered by the contract.

A. Pursuant to California Government Code section 4106, subcontractors who will perform work or labor or render services in an amount in excess of one-half of one percent of the Contractor's total bid shall be set forth in a list of subcontractors within the bid documents. Such list shall be accompanied by an experienced statement with pertinent information regarding similar projects and other evidence of qualifications for each such subcontractor, supplier, individual, or entity if requested by City. If City or engineer, after doing an investigation, has reasonable objection to any proposed subcontractor, supplier, individual, or entity, City may, before the notice of award is given, request the apparent successful bidder to submit a substitute, without an increase in the bid.

B. If the apparent successful bidder declines to make any such substitution, City may award the contract to the next lowest bidder that proposes to use acceptable subcontractors, suppliers, individuals, or entities declining to make the request and substitutions will not constitute grounds for forfeiture of the bid security of any bidder. Any subcontractor, supplier, individual or entity so listed and against which City makes no written objection prior to the giving of the notice of award will be deemed acceptable by City subject to verification of such assessments after the effective date of the agreement as provided herein.

8. NON DEBARRED CONTRACTORS AND SUBCONTRACTORS

The Contractor and all of its subcontractors shall, at the time of bid opening and for performance of this public works contract, be non-debarred contractors and not be ineligible Contractors pursuant to Public Contract Code section 6109 and Labor Code sections 1777.1 and 1777.7.

9. LABOR LAW REQUIREMENTS

Prior to the start of construction, the Contractor and each subcontractor shall submit to the City an executed Checklist of Labor Law Requirements, included within Appendix A, certifying that each Contractor and Subcontractor will comply with the foregoing Labor Law requirements; and fully understands that failure to comply with these requirements will subject it to the penalties cited herein.

By submitting a bid, the prime contractor and subcontractors involved in this project assure that they intend to comply with the labor law requirements noted within Appendix A, fully understanding that failure to comply may subject them to penalties as noted.

10. BID PROTEST PROCEDURES

Any bid protest must be in writing and received by the City Clerk's Office at 35 Cajon Street, Suite 4, Redlands, CA 92373, before 5:00 p.m. no later than two working days following the bid opening (the "Bid Protest Deadline") and must comply with the following requirements:

10.1 General. Only a bidder who has actually submitted a Bid Proposal is eligible to submit a bid protest against another bidder. Subcontractors are not eligible to submit bid protests. A bidder may not rely on the bid protest submitted by another bidder, but must timely pursue its own protest. If required by City, the protesting bidder must submit a non-refundable fee in the amount specified by City, based upon City's reasonable costs to administer the bid protest. Any such fee must be submitted to City no later than the Bid Protest Deadline, unless otherwise specified. For purposes of this Section, a "working day" means a day that City is open for normal business, and excludes weekends and holidays as observed by the City.

10.2 Protest Contents. The bid protest must contain a complete statement of the basis for the protest and all supporting documentation. Material submitted after the Bid Protest Deadline will not be considered. The protest must refer to the specific portion or portions of the Contract Documents upon which the protest is based. The protest must include the name, address, email address, and telephone number of the person representing the protesting bidder if different from the protesting bidder.

10.3 Copy to Protested Bidder. A copy of the protest and all supporting documents must be concurrently transmitted by fax or by email, by or before the Bid Protest Deadline, to the protested bidder and any other bidder who has a reasonable prospect of receiving an award depending on the outcome of the protest.

10.4 Response to Protest. The protested bidder may submit a written response to the protest, provided the response is received by the City Clerk's Office before 5:00 p.m., within two working days after the Bid Protest Deadline or after actual receipt of the bid protest, whichever is sooner (the "Response Deadline"). The response must include all supporting documentation. Material submitted after the Response Deadline will not be considered. The response must include the name, address, email address, and telephone number of the person representing the protested bidder if different from the protested bidder.

10.5 Copy of Protesting Bidder. A copy of the response and all supporting documents must be concurrently transmitted by fax or by email, by or before the Bid Protest Deadline, to the protesting bidder and any other bidder who has a reasonable prospect of receiving an award depending upon the outcome of the protest.

10.6 Exclusive Remedy. The procedure and time limits set forth in this section are mandatory and are the bidder's sole and exclusive remedy in the event of a bid protest. A bidder's failure to comply with these procedures will constitute a waiver of any right to further pursue a bid protest, including filing a Government Code Claim or initiation of legal proceedings.

10.7 Right to Award. The City Council reserves the right to award the Contract to the bidder it has determined to be the responsible bidder submitting the lowest responsive bid, and to issue a notice to proceed with the Contract notwithstanding any pending or continuing challenge to its determination.

PROPOSAL

TO: THE CITY OF REDLANDS, SAN BERNARDINO COUNTY, CALIFORNIA herein called the "City".

Pursuant to and in compliance with your Notice Inviting Bids, and the other documents relating thereto, the undersigned Bidder, having familiarized themselves with the terms of the Contract, the local conditions affecting the performance of the Contract and the cost of the work at the place where the work is to be done, and with the plans thereto, hereby proposes and agrees to perform within the time stipulated, the Contract, including all of its component parts and everything required to be performed, and to provide and furnish any and all of the labor, materials, tools, equipment and all utility and transportation services necessary to perform the contract, and complete in a workmanlike manner, all of the work covered by the contract in connection with the City's Project identified as

WWTP Hillside Stabilization and Stairway Improvements Project
Project No. 521038

NOTE: Bidders must bid on each item in this schedule. All entries in the entire PROPOSAL must be made clearly and in ink. Mistakes shall be lined through and the correct amount written above and initialed by the authorized agent of the Bidder.

BID SCHEDULE

(See "Section 01200 – Measurement and Payment" for Bid Item description)

Item No.	Brief Description	Estimated Quantity	Unit Price (If Applicable)	Total Price in Figures
1	Mobilization (Maximum 5% of Total Bid Price)	LUMP SUM	N/A	$_____
2	SWPPP	LUMP SUM	N/A	$_____
3	Construction Staking	LUMP SUM	N/A	$_____
4	Retaining Wall (gray precision block)	352 LF	$_____/LF	$_____
5	Concrete Block Slough Wall	178 LF	$_____/LF	$_____
6	Reinforced Concrete Stairway	733 SF	$_____/LF	$_____
7	Metal Hand Railings	231 LF	$_____/LF	$_____
8	V-Ditch	336 LF	$_____/LF	$_____

BID SCHEDULE (CONTINUED)

(See "Section 01200 – Measurement and Payment" for Bid Item description)

Item No.	Brief Description	Estimated Quantity	Unit Price (If Applicable)	Total Price in Figures
9	U-Channel	25 LF	$_____/LF	$_____
10	Grate Inlets	8 EA	$_____/EA	$_____
11	Stairway Lights (Solar)	4 EA	$_____/EA	$_____
12	Landscape & Irrigation	LUMP SUM	N/A	$_____
13	Construct 4" Thick Concrete Slab w/ #3 Bars @ 24" O.C.E.W. & #3 Cont. Bar at Edge	83 SF	$_____/SF	$_____
14	Construct V-Drain Per Detail on Sheet 3	55 LF	$_____/LF	$_____
15	Remove and Dispose of Existing V-Drain	65 LF	$_____/LF	$_____
16	Construct Retaining Wall Utility Opening Per SPPWC STD. 617-3	5 EA	$_____/EA	$_____
17	Earthwork and/or Export Material	300 CY	$_____/CY	$_____
18	Unforeseen work not covered within all other bid items	LUMP SUM	N/A	$_____30,000_____
19	Demobilization	LUMP SUM	N/A	$_____
			TOTAL PRICE (ITEMS 1-19)	**$_____**

Last Minute Additions/Deductions*_____ Bid Item No._____

Last Minute Additions/Deductions*_____ Bid Item No._____

Last Minute Additions/Deductions*_____ Bid Item No._____

BID SCHEDULE TOTAL PRICE: $_____

BID SCHEDULE TOTAL PRICE WRITTEN IN WORDS: _____

_____

_____

LOW BID DETERMINATION:

The low bid will be determined pursuant to Public Contract Code Section 20103.8 as the lowest bid price on the Bid Schedule Total Price on page BD 11. A responsible bidder who submits the lowest bid as determined by the above method shall be awarded the contract, if it is awarded, by the City Council of the City of Redlands.

ADDENDA

Receipt of the following addenda is hereby acknowledged and the same is included in the Bid Price:

Addendum #1_____ (initials) Addendum #2_____ (initials) Addendum #3_____ (initials)

Addendum #4_____ (initials) Addendum #5_____ (initials) Addendum #6_____ (initials)

ATTEST: (if Corporation)

(Corporation Seal)

_____ _____
Company Name Signature

_____ _____
Address Name

_____ _____
City, State, Zip Title

BID CERTIFICATION

The undersigned certifies that they are familiar with the various State and local laws affecting labor, length of working days, employer's liabilities, Sunday work, alien labor, domestic materials, Subcontractors, etc.

It is understood and agreed that the work under the contract will be commenced by the undersigned Bidder, if awarded the contract, within ten (10) calendar days from the date in the Notice to Proceed and will be completed by the Contractor in the time set forth in the **CONTRACT**.

Enclosed find Bidders bond or certified or cashier's check No. _____ on the _____ Bank, in the amount of _____ _____ which is not less than ten percent (10%) of the Bid submitted by the undersigned, made payable to the City of Redlands, California and which is given as a guarantee that the Bidder agrees that in case of their default in executing said contract with necessary bonds, the bond or check accompanying this Bid and the money made payable shall become and remain the property of the City of Redlands.

It is understood and agreed that the City of Redlands has the right to waive defects or irregularities and to accept or reject any or all Bids. No Bidder may withdraw their Bid for a period of sixty (60) days after the time of the Bid Opening except as allowed by the California Public Contract Code.

The following information, required by State law under penalty of perjury, is true and correct. Failure to complete this information renders the bid non-responsive, and the bid must be rejected.

_____	_____
Company Name	Signature
_____	_____
Address	Signatory's Title
_____	_____
City, State, Zip	State License Number and Class
_____	_____
Telephone Number	License Expiration Date

Dated this _____ day of _____, 20___.

BID BOND

KNOW ALL PERSONS BY THESE PRESENTS,

That _____ as Principal, and _____ as Surety, are held and firmly bound unto the City of Redlands, hereinafter called City, in the sum of _____ dollars, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, said Principal has submitted a bid to said City to perform all work required under the Project No. 521038.

NOW, THEREFORE, if said Principal is awarded a contract by said City and, within the time and in the manner required under the heading "Instructions to Bidders" bound with said Specifications, enters into a written contract on the form of agreement bound with said Specifications and furnishes the required bonds, one to guarantee faithful performance and the other to guarantee payment for labor and materials; then this obligations shall be null and void, otherwise it shall remain in full force and effect. In the event suit is brought upon this bond by said City and Judgment is recovered, said Surety shall pay all costs incurred by said City in such suit, including a reasonable attorney's fee to be fixed by the court.

SIGNED AND SEALED, this _____ day of _____, 20____.

_____**(SEAL)**
(Principal)

By:_____
(Signature)

_____**(SEAL)**
(Surety)

By:_____
(Signature)

Address:_____

_____

Telephone (___)_____

(Seal and Notarial Acknowledgment of Surety)

STATEMENT BY BIDDER
NON-COLLUSION AFFIDAVIT

STATE OF)
) ss
COUNTY OF)

_____, being first duly sworn, deposes and says that

he is
(Sole Owner, a Partner, President, Secretary, etc.)

of
(Contractor)

the party making the foregoing bid on Project No. 521038 that such bid is not made in the interest of or on behalf of any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the Bidder has not directly or indirectly induced or solicited any other Bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any Bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the Bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the Bidder or of any other Bidder or to fix any overhead, profit, or cost element of the bid price or of that of another bidder, or to secure any advantage against the public body awarding the Contract of anyone interested in the proposed contract; that all statements contained in such bid are true; and further, that the Bidder has not directly or indirectly, submitted his bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company, association organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

By: _____ Title: _____

Subscribed and sworn to before me this _____ day of _____, 20___.

Signature of Officer Administering Oath
(Notary Public)

STATEMENT BY BIDDER
OFFICERS OF CORPORATION (Members of Firm)

The names of all persons interested in the foregoing proposals as principals, are as follows: (IMPORTANT NOTICE - if Bidder or other interested person is a corporation, state legal name of corporation, also names of the president, secretary, treasurer and manager thereof; if a co-partnership, state true name of firm, also names of all individual co-partners composing firm; if Bidder or other interested person is an individual, state first and last names in full).

_____ _____

_____ _____

_____ _____

Licensed in accordance with an act providing for the Registration of Contractors, License

No. _____.

Signature of Bidder _____ Dated_____

NOTE: If Bidder is a corporation, the legal name of the corporation shall be set forth above, together with the signature of the officer(s) authorized to sign contracts on behalf of the corporation; if Bidder is a co-partnership, the true name of the firm shall be set forth above, together with the signature of the partner or partners authorized to sign contracts in behalf of the co-partnership, and if the Bidder is an individual, that signature shall be placed above.

STATEMENT BY BIDDER
SUB-CONTRACTORS LIST

Bidder supplies the following information for any Subcontractor who will perform work or labor or render services to the prime contractor, etc. to be used on Project No. 521038, all in accordance with Section 4104 of the California Public Contract Code.

LICENSED SUBCONTRACTOR'S NAME AND BUSINESS ADDRESS	LICENSE #	SPECIFIC DESCRIPTION OF SUBCONTRACT & BID ITEM #	% OF BID ITEM TO BE PERFORMED

STATEMENT BY BIDDER
QUALIFICATION AND EXPERIENCE STATEMENT

The following outline is a record of the undersigned Bidder's experience in construction of three (3) projects of a type similar in magnitude and character to that contemplated under Project No. 521038 within the past two years. Include the location of each project as well as the name, address, and phone number of the owner, and name of individual to contact.

Subcontractors performing in excess of one half of one percent of the prime Contractor's total bid, or in the construction of streets or highways, one half of one percent of the prime contractor's total bid or ten thousand dollars ($10,000), whichever is greater shall provide a similar outline. Additional pages outlining this portion of the Bid may be attached. Failure to provide this statement may result in rejection of the bid by the City of Redlands.

1. Owner's Name: _____

   Contact Person: _____ Phone: (___) _____

   Address of Owner: _____

   Project Description: _____

   _____

   Amount of Contract: _____ Completion Date: _____

2. Owner's Name: _____

   Contact Person: _____ Phone: (___) _____

   Address of Owner: _____

   Project Description: _____

   _____

   Amount of Contract: _____ Completion Date: _____

3. Owner's Name: _____

   Contact Person: _____ Phone: (___) _____

   Address of Owner: _____

   Project Description: _____

   _____

   Amount of Contract: _____ Completion Date: _____

STATEMENT BY BIDDER
GENERAL INFORMATION

1. Bidder's Mailing Address _____

   _____

2. Number of years engaged in the contracting business under your present firm or trade name:

   _____

3. Have you ever failed to complete any work awarded to you? (Yes or No) _____. If yes, provide details in the space provided in Item 10.

4. Have you ever defaulted on a contract? (Yes or No) _____. If yes, provide details in the space provided in Item 10.

5. Have you ever been a party to a lawsuit or gone to arbitration during the last 5 years? (Yes or No) _____. If yes, provide details in the space provided in Item 10.

6. Has any Stop Notice been filed against you during the last 5 years? (Yes or No) ___. If yes, provide details in the space provided in Item 10.

7. Has your contractor's license ever been suspended, revoked, or subject to disciplinary action? (Yes or No) _____. If yes, provide details in the space provided in Item 10.

8. Contracts currently on hand:

Agency Name	Amount of Contract	Start Date	Completion Date

9. Enter the name of person(s) who inspected the site of the proposed work for your firm and the date of said site inspection.

   Name:_____ Date:_____

10. In the space provided, the Bidder shall provide details concerning any "Yes" answers provided in this "General Information" section. Details shall include, but not be limited to, the nature of dispute, name of the agency involved and the final outcome. If requested by the City, the Bidder shall supply additional information, sufficiently detailed, to permit evaluation of the Bidder's ability to perform the work.

Question Number	Details

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CONTRACT DOCUMENTS
(CD)

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PUBLIC WORK CONSTRUCTION CONTRACT

This Public Work Construction contract ("Contract") is made and entered into this ___ day of _____, 2025, by and between the City of Redlands, a municipal corporation, organized and existing under the laws of the State of California (hereinafter "City"), and _____ (hereinafter "Contractor"). City and Contractor are sometimes individually referred to herein as a "Party" and, together, as the "Parties."

In consideration of the mutual promises contained herein, City and Contractor agree as follows:

1. **SCOPE OF WORK:** Contractor shall furnish all materials and will perform all of the work for the following: WWTP Hillside Stabilization and Stairway Improvements Project, Project No. 521038, complete all items as required by the Contract Documents (as herein defined) and Specifications for City's WWTP Hillside Stabilization and Stairway Improvements Project, Project No. 521038 (the "Work").

2. **CONTRACT SUM:** City shall pay Contractor the sum of _____ dollars ($_____) as consideration for its performance of the Work in accordance with the terms and conditions set forth in the Contract Documents. Pursuant to Public Contract Code Section 22300, Contractor has the option to deposit securities with an escrow agent as a substitute for retention of earnings required to be withheld by City pursuant to an escrow agreement as set forth in Public Contract Code section 22300.

3. **TIME FOR COMPLETION:** The Work shall be completed within sixty (60) working day(s) as defined in Section 1-2 of the Standard Specifications for Public Works Construction "Greenbook" from and after the date of City's issuance of a Notice to Proceed to Contractor.

4. **LIQUIDATED DAMAGES:** Contractor's failure to complete the Work within the time allowed will result in damages being sustained by City. Such damages are, and will continue to be, impracticable and extremely difficult to determine. Accordingly, Contractor shall pay to City, or have withheld from monies due to Contractor, the sum of five hundred dollars ($500) for each working day as defined in Section 1-2 of the Standard Specifications for Public Works Construction "Greenbook" in excess of the specified time for completion of the Work. Execution of this Contract shall constitute agreement by City and Contractor that five hundred dollars ($500) per day is the estimated damage to City caused by the failure of Contractor to complete the work within the allowed time. Such sum is liquidated damages and shall not be construed as a penalty, and may be deducted from payments due Contractor if such delay occurs.

5. **CONTRACT DOCUMENTS:** This Contract incorporates by reference the following: Notice Inviting Bids, Instructions to Bidders, Contractor's Proposal, Bid Bond, Agreement, Performance Bond, Labor and Material Bond, Plans, General Conditions, Special Provisions and Specifications, and any addenda thereto (collectively, the "Contract Documents").

6. **ATTORNEYS' FEES:** In the event any action is commenced to enforce or interpret the terms or conditions of this Contract, or the Contract Documents, the prevailing Party in such action, in addition to any costs and other relief, shall be entitled to recover its reasonable attorneys' fees, including fees for use of in-house counsel by a Party.

7. **RESOLUTION OF CONSTRUCTION CLAIMS:** Claims by Contractor in the amount of three hundred seventy five thousand dollars ($375,000) or less shall be made by Contractor and

processed by the City pursuant to the provisions of Part 3, Chapter 1, Article 1.5 of the Public Contract Code (commencing with Section 20104). All claims shall be in writing and include the documents necessary to substantiate the claim. Nothing in subdivision (a) of Public Contract Code Section 20104.2 shall extend the time limit or supersede the notice requirements provided in this case from filing claims by Contractor.

8. **ELIGIBILITY OF CONTRACTOR/SUBCONTRACTOR:** Contractor and all of its subcontractors shall abide by California Public Contract Code, Section 6109, and California Labor Code Sections 1777.1 and/or 1777.7, and certify that they are not debarred and are eligible to work on this project.

9. **ASSIGNMENT OF AGREEMENT:** No assignment by a Party of any rights or interests under this Contract shall be binding on another Party without the written consent of the Party sought to be bound.

10. **SUCCESSORS AND ASSIGNS:** City and Contractor each binds itself and their respective successors and assigns in respect to all covenants, agreements, and obligations contained in the Contract Documents.

11. **SEVERABILITY:** Any provision or part of the Contract Documents held to be void or unenforceable under any law or regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon City and Contractor.

IN WITNESS WHEREOF, the Parties hereto have executed this Contract the day and year first written above.

CITY OF REDLANDS

(SEAL)

By:_____
Mario Saucedo, Mayor

ATTEST:

_____
Jeanne Donaldson, City Clerk

(SEAL)

_____
Name of Contractor

By:_____
Signature of Authorized Agent

_____
Title

_____
Signature of Authorized Agent (if necessary)

_____
Title

_____
Contractor's License No.

WORKER'S COMPENSATION INSURANCE CERTIFICATION

Description of Contract: City of Redlands
Municipal Utilities and Engineering Department
WWTP Hillside Stabilization and Stairway
Improvements Project
Project No. 521038

Every employer, except the State, shall secure the payment of compensation in one or more of the following ways:

a. By being insured against liability to pay compensation by one or more insurers duly authorized to write compensation insurance in this State.
b. By securing from the Director of Industrial Relations, a certificate of consent to self-insure, either as an individual employer, or as one employer in a group of employers, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his or her employees.

CHECK ONE

_____I am aware of the provisions of Section 3700 of the Labor Code which requires every employer to be insured against liability for Workers' Compensation or to undertake self-insurance in accordance with the provisions of that Code, and I will comply with such provisions before commencing the performance of the work and activities required or permitted under this Agreement. (Labor Code §1861).

_____I affirm that at all times, in performing the work and activities required or permitted under this Agreement, I shall not employ any person in any manner such that I become subject to the workers' compensation laws of California. However, at any time, if I employ any person such that I become subject to the workers' compensation laws of California, immediately I shall provide the City with a certificate of consent to self-insure, or a certification of workers' compensation insurance.

I certify under penalty of perjury under the laws of the State of California that the information and representations made in this certificate are true and correct.

Dated this _____ day of _____, 2025.

_____
(Contractor)

_____
(Signature)

_____
(Official Title)

(SEAL)

(Labor Code Section 1861 provides that the above certificate must be signed and filed by the Contractor with the Owner prior to performing the work of the contract.)

FAITHFUL PERFORMANCE BOND

Whereas, the City of Redlands ("City"), State of California, and _____ (hereinafter designated as "Principal") have entered into an agreement dated _____, 2025 ("Agreement") whereby Principal agrees to install and complete certain public improvements (the "Work"), which said Agreement is identified as _____ and is hereby referred to and made a part hereof; and

Whereas, said Principal is required under the terms of the Agreement to furnish a bond for the faithful performance of the Work, now, therefore, we, the Principal and, _____, as Surety, are held and firmly bound unto the City in the penal sum of _____ dollars ($_____) lawful money of the United States, for the payment of which sum we bind ourselves, and our heirs, successors, executors and administrators, jointly and severally, firmly by these presents.

The condition of this obligation is such that if the above bounded Principal, his or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and provisions in the Agreement and any alteration thereof made as therein provided, on his or its part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall faithfully fulfill the one-year guarantee of all materials and workmanship, and shall defend, indemnify and save harmless the City and its elected officials, officers, agents and employees, as therein stipulated, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect.

As a part of the obligation secured hereby and in addition to the face amount specified therefor, there shall be included costs and reasonable expenses and fees, including reasonable attorneys' fees, incurred by the City in successfully enforcing such obligations, all to be taxed as costs and included in the judgment rendered.

As a condition precedent to the satisfactory completion of the Work, the above obligation shall hold good for a period of one (1) year or longer if required by the Agreement after the acceptance of the work by the City, during which time if the Principal shall fail to make full, complete, and satisfactory repair and replacements and totally protect the City from loss or damage made evident during this period from the date of completion of the Work, and resulting from or caused by defective materials or faulty workmanship, the above obligation in penal sum thereof shall remain in full force and effect. The obligations of Surety hereunder shall continue so long as any obligation of the Principal remains.

Whenever the Principal shall be, and is declared by the City to be, in default under the Agreement, the City having performed the City obligations thereunder, the Surety shall promptly remedy the default, or shall promptly, at the City's option:

1. Complete the Work in accordance with its terms and conditions; or

2. Obtain a bid or bids for completing the Work in accordance with its terms and conditions, and upon determination by Surety of the lowest responsive and responsible bidder, arrange for a contract between such bidder and the City, and make available as work progresses sufficient funds to pay the cost of completion of the Work less the balance of the Agreement price, but not exceeding, including other costs and damages for which Surety may be liable hereunder, the

amount set forth above. The term "balance of the Agreement price," as used in this paragraph, shall mean the total amount payable to the Principal by the City under the Agreement and any modifications thereto, less the amount previously properly paid by the City to the Principal.

Surety expressly agrees that the City may reject any contractor or subcontractor which may be proposed by Surety in fulfillment of its obligations in the event of default by the Principal.

Surety shall not utilize the Principal in completing the Work nor shall Surety accept a bid from the Principal for completion of the Work if the City, when declaring the Principal in default, notifies Surety of the City's objection to the Principal's further participation in the completion of the Work.

No right of action shall accrue on the bond to or for the use of any person or corporation other than the City named herein or the successors or assigns of the City. Any suit under this bond must be instituted within the applicable statute of limitations period.

The said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Agreement or to the work to be performed thereunder or the Specifications accompanying the same shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Agreement or to the work or to the specifications.

No final settlement between the City and the Principal shall abridge the right of any beneficiary hereunder whose claim may be unsatisfied.

The Principal and Surety agree that if the City is required to engage the services of any attorney in connection with the enforcement of this bond, each shall pay the City's reasonable attorneys' fees incurred, with or without suit, in addition to the above sum.

In witness whereof, this instrument has been duly executed by the Principal and Surety above named, on _____, 2025.

(SEAL)	(SEAL)
_____	_____
(Contractor)	(Surety)
_____	BY: _____
(Signature)	(Signature)
	Address:_____
	_____
(Seal and Notarial Acknowledgment of Surety)	Telephone ( )_____

LABOR AND MATERIAL BOND

Whereas, the City Council of the City of Redlands, State of California, and _____ (hereinafter designated as "Principal") have entered into an agreement (the "Agreement") whereby Principal agrees to install and complete certain designated public improvements (the "Work"), which said agreement, dated _____, 2025, and identified as WWTP Hillside Stabilization and Stairway Improvements Project, Project No. 521038 is hereby referred to and made a part hereof; and

Whereas, under the terms of the Agreement, Principal is required before commencing the performance of the Work, to file a good and sufficient Labor and Material bond with the City of Redlands to secure the claims to which reference is made in Title 3 (commencing with Section 9550) of Part 6 of Division 4 of the Civil Code of the State of California.

Now, therefore, said Principal and the undersigned as corporate surety, are held firmly bound unto the City and all contractors, subcontractors, laborers, material men and other persons employed in the performance of the Agreement and referred to in the aforesaid Code of Civil Procedure in the sum of _____ dollars ($_____) for materials furnished or labor thereon of any kind, or for amounts due under the Unemployment Insurance Act with respect to such work or labor, that said surety will pay the same in an amount not exceeding the amount hereinabove set forth, and also in case suit is brought upon this bond, will pay, in addition to the face amount thereof, costs and reasonable expenses and fees, including reasonable attorneys' fees, incurred by the City in successfully enforcing such obligation, to be awarded and fixed by the court, and to be taxed as costs and to be included in the judgment therein rendered.

It is hereby expressly stipulated and agreed that this bond shall insure to the benefit of any and all persons, companies and corporations entitled to file claims under Title 3 (commencing with Section 9550) of Part 6 of Division 4 of the Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond.

Should the condition of this bond be fully performed, then this obligation shall become null and void, otherwise it shall be and remain in full force and effect.

The surety hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Agreement or the specifications accompanying the same shall in any manner affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition.

In witness whereof, this instrument has been duly executed by the Principal and surety above named, on _____, 2025.

(SEAL)	(SEAL)
_____	_____
(Contractor)	(Surety)
_____	BY: _____
(Signature)	(Signature)
	Address: _____
(Seal and Notarial Acknowledgement of Surety)	_____
	Telephone: ( )_____

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GENERAL CONDITIONS
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GENERAL CONDITIONS

The Standard Specifications for Public Works Constructions, 2021 Edition (Greenbook), together with supplements as published by Building News, Inc., are modified herein and comprise the Standard Specifications. For convenience, the section and subsection numbering system used in these modifications correspond to those used in the Greenbook. Unless specifically deleted or modified herein, all requirements of the Greenbook shall prevail.

SECTION 1 – GENERAL, TERMS, DEFINITIONS, ABBREVIATIONS, UNITS OF MEASURE, AND SYMBOLS

1-2 TERMS AND DEFINITIONS.

Agency - *Amend as follows:*
"The legal entity (City) for which the Work is being performed."

Bidder - *Amend as follows:*
"Any individual, firm, partnership, corporation, or combination thereof, licensed in accordance with the provisions of Chapter 9, Division III of the Business and Professions Code, submitting a Bid for the Work, acting directly or through a duly authorized representative."

City. The City of Redlands, San Bernardino County, California, being the legal entity for which the Work is being performed. Also referred to as Agency or Owner.

City Council. The City Council of the City of Redlands, San Bernardino County, California, being the body authorizing entrance into legal agreements and allowing work in public right-of-way or on public property controlled by the City of Redlands. Also referred to as Board.

Engineer - *Amend as follows:*
"The City Engineer of the Agency, or other person designated by the City Engineer, acting either directly or through authorized agents."

Fabricated. An item specifically assembled or made out of selected materials to meet individual design requirements.

Guarantee. See Warranty.

Laboratory. The designated laboratory authorized by the City of Redlands to test materials and work involved in the Contract.

Manufactured. A standard mass-produced unit or item meeting design requirements.

Owner. The City of Redlands, San Bernardino County, California.

Pavement. The uppermost layer of material placed on the traveled way or shoulder. Also referred to as surfacing.

Rain Day. A scheduled working day when you cannot perform work on the controlling activity for at least 50 percent of the day with at least 50 percent of the normal labor and equipment due to adverse weather-related conditions that cause the Contractor to dismiss the crew.

Street - *Delete and replace with the following:*
"Any road, highway, parkway, freeway, avenue, street, lane, alley, crossing, intersection, court, place, circle, walk, way, or any public right-of-way within the jurisdiction of the Agency."

Surety - *Delete and replace with the following:*
"An admitted corporate surety as listed by the United States Department of Treasury and duly licensed to conduct business in the State of California and County of San Bernardino and acceptable to the City of Redlands, bound with and for the Contractor for the acceptable performance, execution, and completion of the Work, and for the satisfaction of all obligations incurred."

Warranty. An extended insurance by the Contractor, of any product or item of work installed as a part of this project for replacement and/or repair for the time period specified, including but not limited to, all parts, labor, materials, tools, equipment costs, etc. necessary for the product or item of work to be in proper and acceptable working condition after completion of the project. For the purposes of this Contract, the period of coverage shall begin on the date of the Notice of Completion filed by the Owner.

Working Hours. Unless specified otherwise, working hours shall be from 7:00 AM to 4:00 PM, Monday through Friday, inclusive. Saturdays, Sundays, and City Holidays, as shown on the current year Construction Schedule, are excluded unless authorized by the City.

1-7.2 CONTRACT BONDS. - *Add the following sentence to paragraph 1:*
The warranty provisions set forth in Section 7-18 shall be secured by the Contract Performance Bond required under this section and said Bond shall remain in full force and effect for a period of one year from the date of completion as specified in the Notice of Completion.

SECTION 2 - SCOPE OF THE WORK

2-2 PERMITS. - *Amend the following:*

Amend the first sentence of paragraph 1 as follows:
"The Contractor will obtain all permits necessary to perform the work in streets, highways, railways or other rights-of-way."

Add the following sentence between the first and second sentences of paragraph 1:
For all work within Caltrans right-of-way, the Contractor shall obtain their own Caltrans Encroachment Permit and pay all necessary permit and inspection fees as required by Caltrans.

Add the following paragraph:
The Contractor shall, prior to the start of work, procure all permits and licenses, including but not limited to, a City Business License for itself, subcontractors, and all parties performing actions associated with this contract within the City of Redlands, City Truck Route Permit, City Street/Lane Closure Permit, City Encroachment Permit, USA Verification Number, DOSH Excavation Permit, other permits required by agencies and/or utilities having jurisdiction on the work, pay all charges and fees required by the City, other agencies and utilities, and give all notices necessary and incidental to the due and lawful prosecution of the work. All City permits associated with this project are no fee to the Contractor.

SECTION 3 - CONTROL OF THE WORK

3-7 CONTRACT DOCUMENTS.

3-7.1 General. – *Add the following paragraphs:*
Contractor's working drawings or plans for any structure not included in the plans shall be approved by the Engineer before any work is performed. It is mutually agreed that approval by the Engineer of the Contractor's working plans does not relieve the Contractor of any responsibility for accuracy of dimensions and details, and that the Contractor shall be responsible for agreement and conformity of their working plans with the approved plans and specifications.

Finished surfaces in all cases shall conform with the lines, grades, cross sections, and dimensions shown on the approved plans. Deviations from the approved plans will be determined by the Engineer and approved in writing. In the event of a discrepancy between any drawing and the figures written thereon, the figures shall be taken as correct.

Should it appear that the work to be done or any matter thereto is not sufficiently detailed or explained by the plans and specification, the Contractor shall apply to the Engineer for such further explanation as may be necessary and shall conform to such explanation or interpretation as part of the Contract so far as may be consistent with the intent of the original plans and specifications.

3-7.1.1 Preconstruction Meeting. The Contractor to whom the contract is awarded, and all his major subcontractors, shall attend a pre-construction meeting. The time and location of said meeting will be set by the City. Contractor will be given adequate notice of such meeting. It shall be the Contractor's responsibility to notify his subcontractors of the time and location of the meeting. All submittals as required under the General Requirements shall be submitted by the Contractor at the time of the meeting.

The Contractor will be provided with an electronic (.PDF file) of the conformed plans and specifications for their use throughout the project. Contractor is responsible for all costs of reproduction.

Progress meetings will be scheduled by the City. The Contractor will be given at least five working days notice of the time and location of said meetings. The Contractor has the responsibility of notifying his subcontractors, suppliers, and fabricators of the time and location of said meetings. Meetings will be held either at the job site, at the offices of the City of Redlands, or at any other

location approved by the City. The Contractor may request, in writing, that a meeting be held. The City will schedule a meeting at the Contractor's request not more than five working days after receiving said written notice.

3-7.2 Precedence of Contract Documents. – *Replace paragraph 2 with the following:*
The precedence shall be (A. being highest, O. being lowest):

A. Permits from other Agencies as may be required by law.
B. Change Orders.
C. Contract.
D. Addenda.
E. Bid Schedule/Proposal.
F. General Requirements.
G. Technical Specifications.
H. Plans.
I. MUED General Permit Conditions and Trench Specifications.
J. City of Redlands Water & Sewer Systems Standard Specifications.
K. General Conditions.
L. City of Redlands Standard Specifications and Detail Drawings for Design and Construction of Public Improvements and all Supplements
M. Standard Specifications for Public Works Construction (SSPWC), 2018 Edition
N. Standard Plans for Public Works Construction, 2012 Edition
O. Reference Specifications.

3-8.7 Record Drawings. The Contractor shall maintain at the job site, a set of record drawings for the work showing: exact location information of all existing underground utilities encountered, final locations determined in the field, any deviations from the plans and specifications and new work performed within the work area; and all differences between the work as drawn and as installed for all concealed work as well as work added which is not shown on the drawings. Concealed work shall mean all work installed underground or in an area which cannot be readily inspected by use of access panels, inspection plates or other removable features. When vacuum excavation (potholing) services are required, contractor to provide report that identifies depth and alignment of underground utilities.

These record drawings shall be kept current and legible, and shall be available for inspection at all times by the Engineer, Architect and Contractor. All information, changes in the work or work added on these record drawings shall be marked in red. All markings shall use the same legends that are used on the drawings. Indicate locations by exact dimensions and elevations. Give dimensions and elevations from a permanent reference point and prepare all changes to scale.

At the end of construction, the contractor shall prepare one set of marked-up prints of the record drawings indicating any and all revisions and changes to the drawings reflecting As-Built conditions. The drawings shall also contain a listing of all subcontractors who worked on the construction project. The As-Built drawings will be submitted to the Municipal Utilities and Engineering Department for review and approval by the City Inspector and Engineer.
The design engineer or City staff shall prepare the final As-Built drawings for record purposes in one of the following two ways: (1) Check out the original drawings from the City and manually revise the

drawings to reflect the As-Built condition; or (2) Re-plot the original drawings electronically on 4 mil mylars and make revisions electronically to reflect the As-Built conditions. The final As-Built drawings will be reviewed and approved by the City Inspector and Engineer

The construction related bonds will not be released by the City until the As-Built drawings are accepted by the Engineer and all City stipulated conditions for the release of the bonds have been satisfied.

3-10 SURVEYING.

3-10.3 Line and Grade. - *Add the following sentences to paragraph 1:*
All distances and measurements shown are and will be made in a horizontal plane. Construction line and grade staking shall be set at maximum intervals of 25 feet when the grade is 0.50 percent or greater. Construction line and grade staking shall be set at maximum intervals of 12 feet when the grade is less than 0.50 percent.

3-10.4 Permanent Survey Markers.
The Registered (licensed) Land Surveyor or Registered Civil Engineer authorized to practice land surveying in accordance with all provisions of Section 8771 of the Business and Profession Code shall be hired as a subcontractor or employed by the Contractor.

3-10.5 Survey Service.
Contractor shall be responsible for: furnishing all surveying and staking, horizontal and vertical, as shown on the plans and in accordance with the specifications; furnishing all staking for sub-grade and base course grades per typical sections; replacing any existing monuments and ties which have been destroyed by construction; identifying, locating and tying out all monuments and ties necessary within the work area; and shall reinstall all disturbed monuments and ties, supplying the Engineer with copies of monument and tie sheets recorded with the County Surveyor in accordance with applicable State law. Monuments shall be approved by the Engineer.

Surveying and staking shall be done by a Registered (licensed) Land Surveyor or Registered Civil Engineer authorized to practice land surveying in accordance with all provisions of Section 8771 of the Business and Professions Code.

Unless otherwise specified, stakes will be set and stationed by the Contractor's surveyor for curbs, headers, sewers, storm drains, structures, rough grade and all other staking necessary for the construction of the work. A corresponding cut or fill to finished grade (or flowline) will be indicated on a grade sheet to be supplied to the Engineer. The Contractor shall dig all holes necessary for line and grade stakes.

3-13 COMPLETION, ACCEPTANCE, AND WARRANTY.

3-13.2 Acceptance. - *Add the following paragraphs:*
The Contractor shall submit written assertion that the work has been completed prior to the Engineer making final inspection. The Engineer will have 48 hours to inspect the work. If the Engineer determines that the work is not complete, written notice will be given.

Until final acceptance of work by the Engineer, the Contractor shall have charge and care thereof from damage caused by the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore, and make good all injuries or damage to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof.

All work which has been rejected shall be remedied or removed and replaced by the Contractor at their expense with work conforming to the plans and specifications. Any defective material or workmanship which may be discovered before final acceptance or within one year from the date of final acceptance shall be immediately corrected by the Contractor at their expense, notwithstanding that it may have been overlooked in previous inspections and estimates. Failure to inspect work at any stage shall not relieve the Contractor from any obligation to perform sound and reliable work as herein described. It is the Contractor's ultimate responsibility to deliver a complete, operational project that complies in all details with these specifications, at the time of final acceptance.

Any omission or failure on the part of the City to discover or notify the Contractor of or to condemn defective work or material at the time of construction shall not be deemed as acceptance, and the Contractor will be required to correct defective work or material prior to final acceptance.

The City will endeavor to locate any errors or defective materials or workmanship and call them to the attention of the Contractor prior to subsequent work being performed. However, the City is under no obligation to do so and shall not be held liable because errors or defective material or workmanship by the Contractor are not discovered prior to subsequent work.

Nothing in this section shall be construed to limit the rights of the City to immediately correct conditions which are unsafe or which pose a public health nuisance. Should said corrections later be found to be caused by defective material and/or workmanship, the Contractor and their surety shall reimburse the City for costs reasonably incurred while attending the situation.

In the event it is necessary for the City to file suit to enforce any liability of the Contractor pursuant to this Section, the City shall be entitled to recover from the Contractor, in addition to all other amounts found due and owing, costs of suit and reasonable expenses and fees including reasonable attorneys' fees incurred by the City in successfully enforcing the Contractor's obligation, all to be taxed as costs and included in any judgment rendered.

3-13.3 Warranty. - *Amend the following:*

Amend the first sentence of the paragraph 3:
"The warranty period for specific items covered under manufacturers' or suppliers' warranties shall commence from the date of the final acceptance, except where longer warranty periods are specified."

Add the following paragraphs:
All start-up and testing shall be complete, approved and accepted before final acceptance, substantial completion, or beneficial occupancy.

The warranty provided herein shall not be in lieu of, but shall be in addition to any warranties or other obligations otherwise imposed by the specifications or by law. The remedies provided herein shall not be exclusive and the City shall be entitled to any and all remedies provided by law.

3-14 INSPECTION.

The Contractor shall notify the Engineer at least 24 hours in advance before inspection is required. Whenever the Contractor varies the period during which work is carried on each day, due notice shall be given to the Engineer so that proper inspection may be provided. Varied working hours may be allowed only upon written authorization from the Engineer.

Work financed in whole or in part with funds from another public entity or performed within the jurisdiction of another public entity shall be subject to inspection at all times by authorized representatives of that entity.

The work shall be ready for inspection, whether by City, other public entities or independent testing laboratories, at the scheduled times arranged by the Contractor. If, in the City's sole judgment, the work is not ready and the inspection must be rescheduled, the Contractor shall be notified. The Contractor shall reschedule the inspection and provide the proper 24 hour notification for the rescheduled inspection. Any costs incurred by the City for rescheduled inspections shall be reimbursed prior to the release of Bonds.

In order to allow for inspection, the Contractor shall notify the City's inspector sufficiently in advance of the permanent concealment of any materials or work. The City's inspector shall make the appropriate notifications to other public entities and independent testing laboratories for inspections. All inspections required in the specifications for this project shall be coordinated through the City's inspector.

If any work is concealed or performed without the prior notice specified, the work shall be subject to such tests or exposure as may be necessary to prove to the City, Architect and Engineer, that the materials used and the work performed are in conformity with the drawings and specifications. All labor, tools, materials and equipment necessary for exposing and testing shall be furnished by the Contractor at their expense. The Contractor shall replace at their expense, any materials or work damaged by exposure or testing.

Overtime inspection may be requested by the Contractor. Overtime inspection includes but is not limited to, any hours worked outside of the inspector's normal working hours including weekends and holidays. Such requests shall be on a case-by-case basis as determined by the Engineer. If the Engineer so determines and approves, overtime inspection shall be paid for by the Contractor at the current City billing rate at the time of request or as billed by other public entities or independent testing laboratories. Any costs incurred by the City for overtime inspection shall be reimbursed prior to the release of Bonds.

SECTION 4 - CONTROL OF MATERIALS

4-1 GENERAL. - *Delete and replace with the following:*

Should any work performed or material furnished under the Contract prove defective or not in accordance with the Plans and Specifications and in the opinion of the Engineer such defect is not of sufficient magnitude or importance to make the work dangerous or unusable, or if the removal of such work is impracticable or will create dangerous or undesirable conditions, the Engineer at his discretion shall have the right and authority to retain such work instead of requiring it to be removed and reconstructed, but he shall make such deductions therefore in the payment due the Contractor as may be just and reasonable.

4-1.1 Warranty of Title. No materials, supplies or equipment for the work under this Contract shall be purchased subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest therein or any part thereof is retained by the seller or supplier. The Contractor warrants clear and good title to all materials supplied and equipment installed and incorporated in the work and agrees, upon completion of all work, to deliver the premises, together with all improvements and appurtenances constructed or placed thereon by him, to the Owner free from any claims, liens, encumbrances or charges, and further agrees that neither he nor any person, firm, or corporation furnishing any material or labor for work covered by the Contract shall have any right to a lien upon the premises or any improvement or appurtenance thereon, provided that this shall not preclude the Contractor from installing metering devices or other equipment of utility companies the title of which is commonly retained by the utility company. Nothing contained in this article, however, shall defeat or impair the right of such persons furnishing materials or labor under any bond given by the Contractor for their protection, or any right under any law permitting such persons to look to funds due the Contractor, which are in the hands of the Owner.

4-1.2 Clayton Act. In submitting a bid to the City, if the bid is accepted the Contractor agrees it will assign to the City all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Section 15) or under the Cartwright Act (chapter 2 [commencing with Section 16700] of Part 2 Division 7 of the Business and Professionals Code), arising from purchases of goods, materials, or services by the Bidder for sale to the City pursuant to the bid. Such assignment shall be made and become effective at the time the City tenders final payment to the Bidder.

SECTION 5 – LEGAL RELATIONS AND RESPONSIBILITES

5-1.1 CONTRACTOR'S EQUIPMENT AND FACILITIES.

A noise level limit of 86 dbA at a distance of 15 m (50 feet) shall apply to all construction equipment on or related to the work whether owned by the Contractor or not. The use of excessively loud warning signals shall be avoided, except in those cases required for the protection of personnel.

5-1.2 General.

The enclosed toilets required by this section shall be located within an approved yard, if one is acquired by the Contractor. If a yard is not acquired by the Contractor or the project is not within a City owned property, the toilets must be installed on a trailer and removed from the jobsite each day. At no times shall toilets be stored within the public right of way outside of working hours.

5-3 LABOR. - *Amend the following:*

5-3.1 General. - *Add the following paragraphs:*
Employment of apprentices are required on projects of $30,000 or more. Provisions in Sections 1777.5 of the California Labor Code fixes responsibility of compliance with that section for all apprenticeable occupations with the Contractor. Section 1777.5 provides that the Contractor and every Subcontractor shall submit contract award information to the applicable joint apprenticeship committee. One apprentice hour for every five journeymen hours worked is the minimum State requirement applicable to each apprenticeable trade. Section 1777.7 of said Labor Code provides that the Contractor shall forfeit as a civil penalty the sum of one hundred dollars ($100.00) for each calendar day of noncompliance with provision of said Section 1777.5.

The Contractor will observe all applicable health and safety requirements, including, but not limited to the California and Federal Occupational Safety and Health Acts. The Contractor shall submit for review by the City a Site Specific Health and Safety Plan prior to the commencement of construction activities. This Plan shall meet or exceed the requirements of 29 CFR 1910.120.

5-3.2 Prevailing Wages. - *Add the following paragraphs:*
Contractors are hereby notified that pursuant to Section 1770 of the Labor Code of the State of California, the City Council of the City of Redlands, California, by Resolution No. 2326, has ascertained the general prevailing rate of hourly wages and rates for legal holidays and overtime work in the locality where this work is to be performed, for each craft or type of workman or mechanic needed to execute the Contract which will be awarded to the successful Bidder. The Contractor shall comply with Sections 1770 to 1780 inclusive of the Labor Code and Master Labor Agreement of Southern California.

The Contractor and each of his subcontractors shall pay each of his employees engaged in work on the project under this Contract in full less legally required deductions and also deductions made pursuant to the regulations prescribed under the so-called "Kick- Back Statute" (48 Sta. 948; U.S.C. 875; 40 U.S.C. 276c).

In accordance with Section 1775 of the California Labor code, Contractor shall forfeit to City, as a penalty, a minimum of $40 for each day, or portion thereof, and a maximum of $200 for each day, or portion thereof, for each worker paid, either by Contractor, or any subcontractor, less than the prevailing rates as determined by the Director of the California Department of Industrial Relations for the work.

Contractor further agrees to fully comply with all applicable provisions of the California Labor Code including but not limited to Sections 1771, 1775, 1776, 1777.5, 1813 and 1815. Failure to abide by prevailing wages and laws by Contractor will be enforced.

The Contractor or subcontractor shall, as a penalty, to the State or political subdivision on whose behalf the contract is made or awarded forfeit twenty-five ($25) dollars for each worker employed in the execution of the contract by the respective contractor or subcontractor for each calendar day during which the worker is required or permitted to work more than 8 hours in any calendar day and 40 hours in any calendar work in violation of Labor Code section 1813.

5-3.3 Payroll Records. – *Delete and replace with the following*:

The contractor and subcontractors shall submit electronic certified payroll on a weekly basis to the City of Redlands through LCPtracker. LCPtracker is a web-based labor compliance management system. The Prime Contractor and Subcontractors and lower-tier Subcontractors will receive an email from LCPtracker providing their log-on identification and temporary password. The Contractors will need to follow the instructions in the email to set-up their permanent password and activate their account. Once their account is setup, LCPtracker Inc. provides either computer based or web based training. Training can be accessed via the "Book Now" button located under the "Projects" tab. The prime contractor shall submit their certified payroll, along with any subcontractor who is performing any labor, on a weekly basis. The prime contractor is responsible for all communication with their subcontractors and shall submit their subcontractor's certified payroll as part of their weekly payroll packet. All labor compliance correspondence and submissions will be made through the LCPtracker software.

All certified payroll shall be submitted no later than 7 days from the close of the pay period. The payroll records shall set out accurately and completely the name, social security number, classification and hourly wage rate of each employee, hours worked by employee during the payroll period and a full weekly wages and the actual weekly wages paid to the employee. Such certified payroll records shall be made available at all time for inspection by the City, the Department of Industrial Relations, the Department of Labor or authorized representatives within ten days of request. The contractor and subcontractor shall preserve weekly payroll records for a period of three (3) years from the date of completion of the Contract. In case on noncompliance with said Section 1776 and after a ten-day period following receipt of written notice, the Contractor shall forfeit to the California Department of Industrial Relations one hundred dollars ($100.00) for each calendar day or portion thereof, for each worker in non-compliance, until compliance is effectuated.

In order to meet labor compliance requirements, all contractors will be required to complete eDocuments which are accessed, submitted and approved through LCPtracker. All eDocuments are required to be signed by an owner/officer or authorized signer. The Prime Contractor and each Subcontractor and every lower-tier Subcontractor and any Vendors subject to this provision shall comply with Title 8, Section 16404 of the California Code of Regulations.

A Fringe Benefit Statement shall be submitted with the first payroll and is required for both the prime contractor and any subcontractors. A new Fringe Benefit Statement will be required when general determinations are issued in February and August. Please refer to the DIR website for additional details. Any weeks where no work was performed must be represented by the submittal of a Statement of Non-Performance covering the 7 day pay period where no hours were worked on the site. Final payroll on the project should state "Final" on the certified payroll, and must be marked as such in the LCPtracker system.

Failure by the Contractor to comply with the aforementioned requirements shall result in withheld progress payments until such time certified payroll documents have been received, reviewed, and accepted by the City. The City reserves the right to seek assistance from the State Department of Industrial Relations in determining the acceptability of certified payroll submittals before release of withheld progress payments. Prior to the release of retention monies, all certified payroll must be submitted on the project and any outstanding issues that may have occurred throughout the project must be resolved.

5-4 INSURANCE. - *Delete Section 5-4.1, Section 5-4.2 and replace with the following:*
Before entering into a Contract, the Bidder to whom the Contract has been awarded shall furnish satisfactory evidence that they have secured all required insurance from a responsible insurance company authorized to do business in California and satisfactory to the City, and such insurance shall be maintained in full force and effect at the Contractor's own expense during the life of the Contract. Contractor shall furnish the City with the customary Certificates of Insurance for all required insurance listed below. General Liability Insurance shall name the City and the Consultant, as an additional insured and shall be primary and non-contributing to any insurance or self-insurance maintained by the City. All liability insurance policies shall bear an endorsement or shall have attached a rider whereby it is provided that, in the event of expiration or proposed cancellation of such policies for any reason whatsoever, the City shall be notified by registered mail, return receipt requested, giving sufficient time before the date thereof to comply with any applicable law or statute, but in no event less than forty five (45) days before expiration or cancellation is effective.

The coverage shall provide the following minimum limits based on the type of work proposed under this Contract. The Contractor shall determine if the proposed work requires Tier 1 or Tier 2 Designated Insurance Requirements shown below.

CONTRACTED OPERATIONS DESIGNATED AS TIER 1		
Air Conditioning (HVAC) Systems (installation)	Electric Light or Power Line Construction	Pipeline Construction
Airport Runways (paving, repaving, etc.)	Elevator Work	Roofing
Blasting Operations	Excavation	Sandblasting
Bridge or Elevated Highway Construction	Fire Suppression Systems (installation)	Sewer and Water Main Construction
Buildings Structural Work (including elevators)	Gas Mains or Connections Construction	Sign Erection (streets)
Building Structure (raising or moving)	Geophysical Exploration	Solar Energy
Cable Installation in Conduits and Conduit Construction (streets)	Grading of Land	Street Cleaning
Caisson or Cofferdam Work	Hazardous Materials Contractors	Street or Road Construction
Dam or Reservoir Construction	Irrigation or Drainage Construction	Tank Construction, Installation, Erection or Repair
Demolition (structures)	Landscape Construction (street or street medians)	Telephone or Cable Line Construction
Drilling	Painting (exterior greater than single story)	Tree Pruning, Dusting, Spraying or Removal

TIER 1 DESIGNATED INSURANCE REQUIREMENTS

a. Commercial General Liability
   - $1 Million Per Occurrence/ $2 Million Aggregate
     - City listed as an Additional Insured on the coverage
     - Coverage is primary and non-contributory

- If scope of work is within 50 feet of any railroad, endorsement citing inclusion of liability associated with this work is required
- If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission

b. Business Auto Liability
   - $1 Million Combined Single Limit
     - City listed as an Additional Insured on the coverage
     - Must include liability arising from all owned, leased, hired, and non-owned autos
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission
   - If Contractor or its subcontractors or suppliers haul hazardous material (including, without limitation, waste), Auto Liability insurance must be applicable to all hazardous waste hauling vehicles, and include MCS 90 and CA9948 Endorsements.

c. Commercial Umbrella/ Excess Liability
   - $5 Million Per Occurrence/ Aggregate
     - City listed as an Additional Insured on the coverage
     - Coverage is primary and non-contributory
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission

d. Workers Compensation
   - $1 Million Per Occurrence for Bodily Injury by Accident
   - $1 Million Each Employee for Bodily Injury by Disease
   - $1 Million Policy Limit for Bodily Injury by Accident
     - Waiver of Subrogation in favor of City
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission

e. Pollution Policy (Hazardous Materials) [If Applicable]
   - Required of Projects that involve Demolition and/or Excavation Activities
   - $1 Million Per Occurrence/ $2 Million Aggregate
   - City listed as an Additional Insured on the coverage

CONTRACTED OPERATIONS DESIGNATED AS TIER 2		
Air Conditioning (HVAC) Systems (service and repair)	Carpentry (building interiors)	Fire Suppression Systems (service and repair)
Alarms and Alarm Systems	Communications Equipment Installation (interior)	Landscape Construction
Building Interior Work (service, repair and non-structural remodeling)	Driveway, Parking Area or Sidewalk (paving or repaving)	Painting (exterior)
Cable Installation in Conduits (buildings)	Fence Erection	All Other Job Types including Vendors

TIER 2 DESIGNATED INSURANCE REQUIREMENTS

a. Commercial General Liability
   - $1 Million Per Occurrence/ $2 Million Aggregate
     - City listed as an Additional Insured on the coverage
     - Coverage is primary and non-contributory
     - If scope of work is within 50 feet of any railroad, endorsement citing inclusion of liability associated with this work is required
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission

b. Business Auto Liability
   - $1 Million Combined Single Limit
     - City listed as an Additional Insured on the coverage
     - Must include liability arising from all owned, leased, hired, and non-owned autos
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission
   - If Contractor or its subcontractors or suppliers haul hazardous material (including, without limitation, waste), Auto Liability insurance must be applicable to all hazardous waste hauling vehicles, and include MCS 90 and CA9948 Endorsements.

c. Workers Compensation
   - $1 Million Per Occurrence for Bodily Injury by Accident
   - $1 Million Each Employee for Bodily Injury by Disease
   - $1 Million Policy Limit for Bodily Injury by Accident
     - Waiver of Subrogation in favor of City
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission

d. Pollution Policy (Hazardous Materials) [If Applicable]
   - Required of Projects that involve Demolition and/or Excavation Activities
   - $1 Million Per Occurrence/ $2 Million Aggregate
   - City listed as an Additional Insured on the coverage

Contractor expressly waives all rights to subrogation against the City, its officers, employees and volunteers for losses arising from work performed by Contractor for City by expressly waiving Contractor's immunity for injuries to Contractor's employees and agrees that the obligation to indemnify, defend and hold harmless provided for in this Agreement extend to any claim brought by or on behalf of any employee of Contractor. This waiver is mutually negotiated by the parties. This shall not apply to any damage resulting from the sole negligence of City, its agents and employees. To the extent any of the damages referenced herein were caused by or resulted from the concurrent negligence of City, its agents or employees, the obligations provided herein to indemnify, defend and hold harmless are valid and enforceable only to the extent of the negligence of contractor, its officers, agents and employees.

Subcontractors. The prime contractor shall include all subcontractors as insureds under its policies or shall furnish separate certificates and endorsements from each subcontractor.

The Contractor shall not assign or sublet the contract, in whole or in part, without the written consent of the City, nor shall the contractor assign any monies due to, or to become due to, Contractor hereunder without prior written consent of the City.

The Contractor shall be fully responsible to the City for the acts and omissions of the subcontractor and persons either directly or indirectly employed by the Contractor. Consent to subcontracting part of the work shall, in no way, release the Contractor from responsibility for performance of the work, and Contractor will be held, in all respects, accountable for the same as if no consent had been given. The Contractor shall give personal attention to this work which is sublet. Nothing contained in the contract documents shall create any contractual relation between any subcontractor and the City.

Hold Harmless and Indemnification. Contractor shall indemnify, hold harmless and defend City and its elected officials, agents and employees and the Consultant from and against any and all claims, losses or liability, including attorney's fees, arising from injury or death to persons or damage to property occasioned by any act, omission or failure to act of Contractor, its subcontractors, and any officers, agents and employees in performing the work required by this Agreement. Contractor's obligations under this provision shall not be limited in any way by any terms of this Agreement, or the insurance limits.

5-4.3 Worker's Compensation Insurance. - *Delete and replace with the following:*

A. Contractor shall have worker's compensation and employer's liability insurance in force throughout the duration of the contract in an amount which meets the statutory requirement with an insurance carrier acceptable to the City. The insurance policy shall include a provision prohibiting cancellation of said policy except upon forty-five (45) days prior written notice to City. Certificates of Insurance shall be delivered to the City at the time of the Contractors' execution of the agreement.

B. Contractor expressly waives all rights to subrogation against the City, its officers, employees and volunteers for losses arising from work performed by Contractor for City by expressly waiving Contractor's immunity for injuries to Contractor's employees and agrees that the obligation to indemnify, defend and hold harmless provided for in this Agreement extend to any claim brought by or on behalf of any employee of Contractor. This waiver is mutually negotiated by the parties. This shall not apply to any damage resulting from the sole negligence of City, its agents and employees. To the extent any of the damages referenced herein were caused by or resulted from the concurrent negligence of City, its agents or employees, the obligations provided herein to indemnify, defend and hold harmless are valid and enforceable only to the extent of the negligence of contractor, its officers, agents and employees.

5-6 PATENT FEES OR ROYALTIES. *Delete and replace with the following:*
The Contractor shall include in its Bid the patent fees or royalties on any patented article or process which may be furnished or used in the Work. The Contractor shall indemnify and hold the City

harmless from any legal action that may be brought for infringement of patents. The Contractor's attention is directed to "Notice of Patents, Data, and Copyright Regulations" of the Federal Labor Standards.

The Contractor shall bear all costs arising from the use of patented goods and/or processes used on and/or incorporated into the Work. When use of these goods and/or processes is judged to be an infringement and the use is banned, the Contractor, at its own expense, shall, with concurrence of the Engineer, do one of the following:

A. Secure for the City the right to continue using goods and/or processes by suspension of the injunction or by procuring a license(s);

B. Replace said goods and/or processes with non-infringing goods and/or processes;

C. Modify said goods and/or processes so that they become non-infringing; or

D. Remove said goods and/or processes and refund the sum paid therefore without prejudice to any other rights of the City.

The preceding shall not apply to any goods manufactured to the detailed design of the City contained in the Contract Documents.

5-7 SAFETY.

5-7.1 Work Site Safety.

5-7.1.1 General. - *Amend the following:*

Add the following sentences to paragraph 1:
Should watering be the sole method utilized for roadway dust abatement purposes, the maximum time interval that shall elapse between applications thereof shall be no greater than 3 hours during normal working day, supplemented by an additional application thereof immediately prior to the conclusion of the workday and at such other times as may be required, including evenings, weekends and holidays as required by the Engineer. Should the Contractor be unable to furnish dust abatement as specified, the City may perform or cause to be performed the necessary service, the expense of which will be deducted from the payment due the Contractor.

Add the following paragraphs:
To insure the protection of storm drain inlets, Best Management Practices (BMPs) shall be employed during cleanup and dust control operations. Refer to Section 7-8.6.

Compliance with this section is of extreme importance to the City and its citizens. The City may fine the Contractor $1,000 per incident if there are issues with dust, mud, unused equipment or materials and rubbish within the construction area that result in citizen complaints. A 24 hour notice shall be issued to the Contractor and failure to correct the problems will result in the fine being levied. This fine will be in addition to those fines potentially charged for NPDES violations.

5-8 AIR POLLUTION CONTROL.

Dust control shall be performed in accordance with Subsection 7-8 of the Standard Specifications, South Coast Air Quality Management District (SCAQMD) Rule 403, the general Provisions and the following Provision.

Dust resulting from the Contractor's performance of the work, either inside or outside, the right-of-way shall be controlled by the Contractor. Dust control includes the action necessary to prevent, reduce or control dust within the work area as required to complete the work. The Contractor shall carry out proper and efficient measures to prevent his operations from producing dust in amounts damaging to property or causing a nuisance, or harm to persons living nearby or occupying buildings in the vicinity of the work. The Contractor shall control dust 24 hours a day, seven days a week. The methods to be used for controlling dust in the construction area and along haul roads shall be approved by the Engineer prior to starting any work. The Rule 403 Implementation Handbook published by the SCAQMD, contains a detailed listing of reasonably available dust control measures.

Dust control ordered by the Engineer to be applied on Saturdays, Sundays or holidays will be included in the Contract price for dust control and no additional compensation will be allowed therefore.

The full compensation for all direct and indirect costs incurred for work performed or materials used to control dust resulting from the Contractor's performance of the work and caused by public traffic, either inside or outside the right-of-way shall be considered as included in the Contract prices paid for the various items of work involved and no additional compensation will be allowed therefore.

5-9 STORAGE OF EQUIPMENT AND MATERIALS.

The Contractor shall be required to provide and maintain as necessary, any additional property required for storage of equipment, materials, etc., to perform work on this project. Should the additional property be located within the city limits of the City of Redlands, the Contractor shall obtain written approval from the City of Redlands Development Services Department and comply with all conditions set therein prior to use. When private property is used for a yard area, the Contractor shall also secure written authorization from the private property owner and supply a copy of such to the City before any monthly progress payment is submitted. Contractor to propose designated areas of the project site, upon approval by the Engineer, suitable for material delivery, storage, and waste collection.

The Contractor shall ensure the construction yard adheres to all local, State and Federal regulations, ordinances, codes and maintained in a neat and orderly manner throughout the duration of the project. The contractor shall include the construction yard in the Erosion Control Plan or SWPPP and shall be inspected and approved prior to use of the yard. If at any time during the project the location of the construction yard changes from the approved site, the City shall be notified prior to relocation for inspection and approval. Should the Contractor fail to comply with these conditions, the Engineer may suspend the work per SSPWC section 6-3 until the condition is corrected.

At the end of the project or as required, the Contractor shall: clean up and remove all trash and debris, including all organic trash and debris; clean up and remove all hazardous and biochemical wastes from the property to the satisfaction of the agency (City, County, State, or Federal) charged with overseeing these items; and provide to the City a written release from the private property owner that they are satisfied with all clean up and removal work.

5-9.1 Storage in Public Streets.
Construction materials and equipment shall not be stored within public streets or right of way without prior approval from the City. In order to seek approval, Contractor shall submit a location map with all equipment or materials identified including size, duration and any BMP's installed and provide at least 7 days for review by the City.

5-10 WATER POLLUTION CONTROL.

The Contractor shall follow the City's guidelines for Storm Water Pollution Prevention in providing storm water pollution control at the project site, including the implementation of approved Erosion/Sediment Control Plans during construction as well as the implementation of approved Water Quality Management Plans.

Construction activities disturbing 1 acre or more of land shall comply with the State Water Resources Control Board's NPDES General Construction Storm Water Permit. A copy of the Notice of Intent (NOI) to include the Waste Discharge Identification (WDID) number shall be submitted as part of the Storm Water Pollution Prevention Plan (SWPPP) to the Engineer for review. Call (909) 782-4130 for NOI/WDID information.

All projects requiring grading shall submit to the City for review and approval an Erosion/Sediment Control Plan and a Grading Plan. Permit(s) will not be issued until plans are approved and may be revoked if work required in these specifications are not complied with.

Construction sites shall be maintained by implementation of BMPs in such manner that pollutants are not discharged from the site to the maximum extent practicable. A few references available to help with selection and implementation of applicable BMPs are:

1. California Storm Water Best Management Practice Handbook, American Public Works Association, March 1993;
2. The Construction Site Best Management Practices Manual, November 2000;
3. Storm Water Pollution Prevention Plan and Water Pollution Control Program Preparation Manual, November 2000;
4. California Regional Water Quality Control Board's San Francisco Bay Region, Guidelines for Construction Projects; and
5. California Regional Water Quality Control Board's San Francisco Bay Region, Erosion and Sediment Control Field Manual, July 1999.

All discharges into the storm drain system are prohibited except for potable water, properly treated discharge, and those discharges specifically approved by the Engineer. The following are some of the prohibited discharges:

1. Discharges that could have an impact on human health or the environment, cause or threaten to cause pollution, contamination, or nuisance;
2. Discharges that exceed any applicable water quality standard contained in a statewide Water Quality Control Plan or local Basin Plan; and
3. Discharges containing hazardous substances equal to or in excess of a reportable quantity listed in Federal regulations 40 CFR, Parts 117 and 302.

Materials that can cause or contribute to pollution or a violation of any applicable water quality standard include, but are not limited to: sediments; solid or liquid chemical spills; wastes from paints, stains, sealants, glues, limes, pesticides or herbicides and wood preservatives or solvents; asbestos fibers, paint flakes or stucco fragments; fuels, oils, lubricants or hydraulic, radiator and battery fluids; fertilizers; vehicle and equipment wash water or concrete wash water; concrete, detergent or floatable wastes; wastes from any engine and equipment steam cleaning or chemical degreasing; and chlorinated potable water line flushings.

Unless exempted or authorized by an NPDES permit, all non-storm water discharges require prior approval by the Engineer or the State Water Resources Control Board with Engineer approval.

During construction, temporary storage of such materials as identified above, must occur in a designated area physically separated from potential storm water runoff, with ultimate disposal in accordance with local, state and federal requirements.

De-watering of contaminated groundwater or discharging contaminated soils via surface erosion is prohibited.

Unless indicated otherwise by the Engineer, all projects, regardless of size, shall submit for review and approval, a Water Quality Management Plan (WQMP). The WQMP shall consist of post construction BMPs which shall remain in effect throughout the life of the facility. Refer to WQMP guidelines.

5-11 TEMPORARY LIGHTS, POWER AND WATER.

Any water drawn from a City fire hydrant shall be via a City owned water meter. Said meter may be obtained from the Municipal Utilities & Engineering Department. Contractor is responsible for payment of a $1200 deposit fee. Said meter shall be returned in a condition like received, less normal wear and tear. All meters are loaned subject to the conditions of the Fire Hydrant Construction Meter Water Service Application. Contractor must provide proposed location of meter and notify Customer Service at (909) 798-7516 each time the meter is relocated during construction. Water reasonably used in connection with the construction contract will be provided at no cost to the Contractor. Water use determined to be wasteful or unreasonable will be charged for at the prevailing rate.

5-12 PROTECTION AND RESTORATION OF EXISTING IMPROVEMENTS.

The Contractor shall relocate, re-establish, repair or replace all existing improvements within the work limits or right-of-way which are not designated for removal (e.g., sprinkler systems, curbs, sidewalks, driveways, fences, walls, signs, utility installations, pavement, structures, etc.) which are damaged or removed as a result of its operations.

Relocations, re-establishments, repairs and replacements shall be at least equal to existing improvements and shall match them in finish and dimension.

All costs to the Contractor for protecting, removing, restoring, relocating, repairing, replacing or re-establishing existing improvements shall be included in the Bid.

The Contractor shall be responsible for the maintenance of the streets and roadways to be used by public and local traffic through and adjacent to the construction zone, from the date of "Notice to Proceed" until the date of acceptance of the completed construction improvements.

Street maintenance shall include filling of potholes, grading of subgrade and base, replacing signs, installing interim pavement striping and markers on the project streets and other side streets within the construction zone. Street maintenance shall also include sweeping and washing of streets, adjacent and connected to the construction zone on a weekly, or more frequent schedule, to prevent the accumulation of dust, dirt, gravel or other deleterious materials, all as necessary to maintain the construction roadways and adjacent streets in a safe, clean and drivable condition for use by public and local traffic.

Upon request from the City for information pertaining to a claim against the contractor, contractor shall provide a written/email response, including all requested information, within 14 calendar days of City's request. If a response with all requested information is not provided to the City within 14 calendar days, a penalty of $500 per calendar day will be assessed to the Contractor by the City.

5-13 PUBLIC CONVENIENCE AND SAFETY.

5-13.1 General.

The Contractor may be allowed to close the roadway, or a portion thereof, to traffic during normal work hours upon approval from the Engineer. During any closure, the Contractor shall allow access for residents, schools, trash service trucks, churches and businesses within the affected portion of roadway, except as required for construction for a reasonable period of time. The Contractor shall notify residents as noted within Section 5-18.

The Contractor shall provide and install barricades, delineators, warning devices and construction signs in accordance with the Work Area Traffic Control Handbook (WATCH) prepared by the Southern California Chapter of the American Public Works Association. During adverse weather or unusual traffic or working conditions additional devices shall be placed as directed by the engineer. All traffic signs and devices shall conform to the current State of California, Department of Transportation (CALTRANS), "Manual of Warning Signs, Lights, and Devices for Use in Performance of Work upon Highways", unless otherwise approved by the Engineer.

Fences, barriers, lights and signs shall be furnished, erected and maintained as necessary to give an adequate warning to the public at all times that the work is under construction and of dangerous conditions to be encountered as a result thereof, and warning and directional signs shall also be erected and maintained as may be required by the City. Should the Contractor fail to furnish a sufficient number of traffic and/or pedestrian safety devices within three (3) hours after being notified, the Owner will place such necessary items and the Contractor shall be liable to the Owner for providing such devices in accordance with the following provisions:

1. For placing of barricades - $15.00 per barricade for each day or part thereof.

   For flashers - $15.00 per flasher for each day or part thereof.

   For traffic cones - $7.50 per cone for each day or part thereof.

2. In the event that the services of the Owner are required outside the normal working hours and/or days or items not noted above are furnished by the City, all costs incurred by the City shall be the responsibility of the Contractor.

The Contractor shall relocate, preserve and maintain the visibility of all signs within the project limits which affect the flow of traffic, as directed by the engineer. Any signs that are missing or found damaged shall be replaced immediately by the Contractor at his expense.

The Contractor shall provide and maintain Class II barricades along excavation edges parallel to the flow of traffic at a spacing of twenty-five feet (25'). Class II barricades mounted with flashers shall be installed around work areas in parkways. Class II barricades shall have alternating black and reflectorized white (or yellow) stripes at an angle of 45 degrees. The stripe with shall be four to six inches.

During paving operations barricades may be supplemented with minimum size eighteen-inch (18") high traffic cones and delineators such that spacing between barricades and/or cones or delineators is no greater than twenty-five feet (25"). At all access points such as intersecting streets, alleys and driveways, barricades and/or cones shall be provided at five-foot (5') intervals so as to prevent vehicular access to the paving area. Where access from an intersecting street is prohibited, a "Road Closed" sign shall be provided. "No Left Turn" sign shall be provided wherever required by the Engineer.

Clearances from traffic lanes shall be 5 feet to the edge of any excavation and 2 feet to the face of any curb, pole, barricade, delineator or other vertical obstruction.

A 4 foot wide pedestrian walkway shall be maintained in the parkway area on each side of all streets, unless otherwise authorized by the Engineer. The minimum clearance from: the edge of pedestrian walkways to any traffic lane shall be 5 feet; the edge of pedestrian walkways to any work zone shall be 3 feet; and the surface of pedestrian walkways to any overhead obstruction shall be 7 feet.

The Contractor shall, at the end of each work day, have backfilled, compacted and placed a temporary drivable roadway surface on all work areas within traveled roadways prior to leaving the job site. Failure to comply to the satisfaction of the Engineer shall result in immediate correction by City forces, and all costs shall be borne by the Contractor.

Traffic control devices shall be marked with the Contractor's name as appropriate. At no time shall any traffic control devices marked with companies or agencies other than the Contractor or subcontractors, be utilized within the work area.

All said traffic controls and safety devices shall be maintained in clean condition, with any and all graffiti removed by the end of workday on which the graffiti was first reported to the Contractor.

If the traffic control devices are deemed unacceptable by the Engineer due to being damaged, dirty, or marked incorrectly, the Contractor shall replace the traffic control devices immediately. Should the Contractor fail to furnish traffic control devices within three (3) hours after being notified, the Owner will place such necessary items and the Contractor shall be liable to the Owner for providing such devices in accordance with the provisions above.

5-13.1.1 Vehicular Access.
At such times as driveways are inaccessible due to the Contractor's work they shall be blocked by two (2) Class II barricades or one (1) Class II barricades and two (2) delineators. Driveways that are ramped or planked for temporary access shall be provided with a delineator at each side.

5-13.1.2 Signage. The Contractor shall furnish, erect and maintain all construction traffic signage as required and specified.

All construction traffic signage shall be in place prior to commencing any work, placed as needed during construction, moved as necessary and removed only upon completion of all work.

All construction traffic signage and controls shall comply with the State of California Manual of Traffic Controls, Warning Signs, Lights and Devices for use in Performance of Work Upon Highways. All construction traffic signage used in the performance of the work shall be a minimum of the encapsulated lens (high intensity) type. All traffic controls and safety devices, equipment and materials, including but not limited to cones, channelizers, delineators, flashing warning lights, barricades, high level warning devices, telescoping flag trees, flags, signs, markers, portable barriers, flashing arrow signs, changeable message signs, markings and flagging equipment shall be provided and maintained in like new condition.

When a Traffic Signal is constructed as a part of the project, the Contractor shall place and maintain for one calendar month, a message board for each approach leg to a new traffic signal. The message board shall read "CAUTION - NEW TRAFFIC SIGNAL". The one month period shall begin from the day of activation. This requirement may be lessened or waived, on a case-by-case basis, by the Engineer.

The Contractor shall furnish and properly install, construct, erect, use and continuously inspect and maintain, twenty-four (24) hours per day, seven (7) days per week, including holidays, all said

devices, equipment and materials and all temporary and permanent pedestrian and driving surfaces as necessary to provide for the safety and convenience of, and to properly warn, guide, control, regulate, channelize and protect the vehicular traffic, pedestrian traffic, project workers, and the public throughout the entire limits of the work activity and beyond said limits as necessary to include areas affecting or affected by the work, from the date of notice to proceed to the completion and acceptance of the work. Any corrective work required to be performed by City forces shall be charged to the Contractor and paid in full before release of any bonds on the project.

All traffic cones shall be no less than 28 inches in height, except that shorter cones, 12 inches minimum height, may be permitted during striping maintenance operations where the only function of the cone is to separate traffic from the wet paint. All barricades used to delineate traffic at night or placed in or adjacent to the traveled roadway at night, shall be equipped with flashing warning lights.

Channelizers shall be required when lane restrictions, detours or other work conditions need to be maintained for periods longer than normal work hours. Channelizers shall be surface-mounted type and shall be furnished, placed and maintained at the locations shown on the plans or as approved by the Engineer and shall conform to these specifications. Channelizers shall be, at the Contractor's option, one of the following types, or approved equal: (1) Safe-Hit SH236SMA; (2) Repo "The Replaceable Post"; or (3) Carsonite, "Super Duck" SDF-436.SDF-436.

5-13.2 Traffic Control Plan

The Contractor shall provide a Traffic Control Plan to the agency for approval prior to the scheduled commencement of work. Comments and corrections shall be returned to the Contractor within five (5) working days.

The Contractor shall be required to maintain one lane in each direction when working on the roadway. Access to schools, businesses, etc. shall be maintained as necessary for their operations. If closures are authorized by the Engineer, all detour signage shall be installed prior to closure of specified portion of roadway(s), and shall be maintained during closure.
The Contractor shall make provision to allow pedestrians full access across work areas at existing crosswalks, while working within those areas.

Traffic controls, including but not limited to vehicular and pedestrian traffic controls, maintenance of vehicular and pedestrian access, detours, and street closures shall be in accordance with Subsection 7-1, of the current edition of the "Standard Specifications for Public Works Construction," including all its subsequent amendments, and the current edition of the "Work Area Traffic Control Handbook."

Traffic control and the Traffic Control Plan shall conform to the following:

a. All major streets shall remain open to through-traffic at all times, residential street will be closed to traffic only as long as it takes for material application and drying time.

b. The Traffic Control Plan shall indicate the traffic control requirements for the different types of work to be performed. The Contractor shall be

responsible for the preparation of Plans as necessary for specific items of work. These Plans shall be approved by the City's Engineer.

c. All traffic controls and safety devices, equipment and materials, including but not limited to cones, delineators, flashing warning lights, barricades, high level warning devices (flag trees), flags, signs, markers, portable barriers, flashing arrow signs, markings, and flagging equipment shall be provided and maintained in "like new" condition.

d. The Contractor shall furnish and properly install, construct, erect, use, and continuously inspect and maintain, twenty-four (24) hours per day, seven (7) days per week, all said devices, equipment and materials and all temporary and permanent pedestrian and driving surfaces as necessary to provide for the safety and convenience of, and to properly warn, guide, control, regulate, channelize and protect the vehicular traffic, pedestrian traffic, project workers, and the public throughout the entire limits of the work activity and beyond said limits as necessary to include area affecting or affected by the work, from the start of work to the completion of the work.

In the event the slurry and cape seal ravels, a "loose gravel" (C6) sign shall be placed to adequately warn the public.

e. High-level warning devices (flag trees) are required at all times for any work being performed within the roadway unless otherwise specifically authorized by the City's Engineer.

f. All barricades shall be equipped with flashing warning lights, and all traffic cones shall be no less than twenty-eight inches (28") in height, except that shorter cones, twelve inches (12") high or higher, may be used during striping maintenance operations where the only function of the cones is to protect the wet paint from the traffic.

g. Type III barricades, no less than six feet (6') in length and equipped with two (2) Type "N" markers each and two (2) flashing warning lights each, shall be used to close streets, except as otherwise specifically authorized in advance by the City's Engineer for minor maintenance work of no more than one (1) working days duration on weekdays, or on holidays only, and between 8:00 a.m. and 3:30 p.m. only. Said barricades shall be placed across the full roadway at each point of closure with the distance between barricades or between barricades and curbs, not exceeding three feet (3'), except that one (1) eleven-foot (11')-wide gap between barricades shall be provided at the center of the street. Barricades to the right of the street's center, facing the inbound vehicular traffic, shall also be equipped with one (1) Type C2 "Road Closed" sign each or one (1) Type C3A "Road Closed to Thru Traffic" sign each.

h. Except for residential streets, as otherwise directed and/or authorized by the City's Engineer, two-way vehicular traffic shall be maintained at all times within two (2) eleven foot (11')-wide lanes on streets, having an effective roadway width of forty-four feet (44') or more with restricted parking, and other streets of lesser widths may be reduced to one (1) twelve-foot (12') wide lane with work activity being limited to one side at a time, and with one-way vehicular traffic being maintained at all times by properly trained and experienced flaggers.

No reduction of the traveled way width shall be permitted on any City street before 8:00 a.m. nor after 3:30 p.m., on weekends or holidays, or when active work is not being done, unless prior authorization to do so is granted by the City's Engineer.

Arrow boards shall be required for all lane closures on major streets.

i. Properly trained and experienced flaggers shall be provided to traffic when said traffic is to be interrupted, when two-way traffic is to be reduced to one-way traffic, and at such other times as is necessary to safely pass the traffic through or around the work area, and when so directed by the City's Engineer.

j. Vehicular access to occupied residential property may be restricted on weekdays other than holidays between the hours of 8:00 a.m. to 3:30 p.m. while essential work activity is taking place, with specific prior written approval from the City's Engineer, providing the Contractor gives the owner and/or resident at least forty-eight (48)-hour advance written and oral notice. See Part 2, "Notification of Residents," herein.

Convenient and safe pedestrian access to occupied residential property shall be maintained at all times. Access to mailboxes must be maintained at all time, such that the postal delivery service is not interrupted.

Access to vacant and unused property may be restricted at the Engineer's discretion. Both vehicular and pedestrian access shall be maintained at all times to all other property except as otherwise specifically authorized in writing by the City's Engineer.

k. Any traffic control and safety devices and equipment being used which becomes damaged, destroyed, faded, soiled, misplaced, worn out, inoperative, lost, or stolen shall be promptly repaired refurbished and/or replaced, and any traffic control and safety devices and equipment being used which are displaced or not in an upright position from any cause, shall be promptly returned or restored to their proper position.

l. An unobstructed view of all signs and warning devices including but not limited to stop signs, stop ahead signs, street names signs, and other regulatory, warning and construction signs, markers, and warning devices shall be maintained at all times. No trucks or other equipment or materials shall be stopped, parked, or otherwise placed so as to obscure said signs, markers, and devices from the view of vehicular and/or pedestrian traffic to which it applies.

m. When entering or leaving roadways carrying public traffic, the Contractor's equipment, whether empty or loaded, shall yield to said public traffic at all times, except where the traffic is being controlled by police officers, fire officers, properly trained and experienced flaggers, or at traffic signalized intersections.

n. Stockpiling and/or storage of materials on any public right-of-way or parking areas will not be allowed without specific permission of the Engineer. Materials spilled along or on said right-of-way or parking areas shall be removed completely and promptly. All stockpile and/or storage areas shall be kept in a safe, neat, clean, and orderly fashion, and shall be restored to equal or better than original condition upon completion of the work.

o. Where vehicular access to abutting property must be restricted, the work shall be so selected, arranged, and scheduled that the person(s) requiring access to said abutting property and/or residents along said streets affected will be able to park within a reasonable distance of not more than five hundred feet (500') from their homes and/or destination. Residents must be supplied written notice of such restrictions a minimum of 48 hours in advance.

p. When work has been completed on a particular street or has been suspended or rescheduled, and said street is to be opened to vehicular traffic, all equipment, "NO PARKING" signs, other obstructions, and unnecessary traffic control devices and equipment shall be promptly removed from that street except as otherwise authorized or directed by the City's Engineer.

q. Should the Contractor be neglectful, negligent, or refuse, fail, or otherwise be unavailable to promptly, satisfactorily, and fully comply with the provisions specified and referred to hereinabove, the City reserves the right to correct and/or mitigate any situation, which in the sole opinion of the City's Engineer constitutes a serious deficiency and/or serious case of noncompliance, by any means at its disposal at the Contractor's and/or permittee's expense, and will deduct the cost therefore from the Contractor's progress and/or final payment. Such corrective action taken by the City shall not reduce or abrogate the Contractor's legal obligations and liability for proper traffic control and safety measures, and shall not serve to transfer

said obligations and liabilities from the Contractor to the City or the City's agents.

r. Violations of any of the above Provisions and/or Provisions of the referenced publications, unless promptly and completely corrected to the satisfaction of the City's Engineer, shall at the sole discretion of the City, be grounds for termination of the Contract, or shut down or partial shutdown of the work, without compensation to the Contractor and/or permittee, or liability to the City, all as prescribed by Contractual obligation or State law, whichever is applicable.

Full compensation for furnishing all labor, materials, tools, equipment, flaggers, lights, channelizers (surface mounted), temporary striping, barricades, portable flashing lights, flashing arrow signs, traffic control and detour plan, and incidentals required to comply with the provisions specified and referred to herein above, to provide all required traffic and pedestrian control for the duration of this contract, all as shown and as specified, shall be paid as specified in Section 01200 of the General Requirements and no other compensation shall be made therefore.

5-13.3 Edison Energized Conductors. The Contractor hereby promises and agrees that in the performance of the Work, he will employ and utilize only qualified persons, as hereinafter defined, to work in proximity to Edison's secondary, primary and transmission facilities. The term "qualified person" is defined as follows:

"Qualified Person". A person by reason of experience or instruction is familiar with the operation to be performed and hazards involved.

Contractor further promises and agrees that the provisions of this paragraph shall be and are binding upon any Subcontractor or Subcontractors that may be retained by it, and that the Contractor shall take such steps as are necessary to insure compliance by said Subcontractor or Subcontractors with the requirements of this paragraph.

5-14 CONTRACTOR'S RESPONSIBILITY FOR DAMAGE.

5-14.1 Responsibility for Damage. The Contractor agrees to and does hereby indemnify, defend and hold harmless the City, its elected officials and the Consultant and their officers, agents and employees from every claim or demand made, and every liability, loss, damage, or expense of any nature whatsoever, including attorney's fees and costs, which may be incurred by reason of:

(a) Liability for damages for (1) death or bodily injury to persons, (2) injury to loss or theft of property, (3) any other loss, damage or expense arising under either (1) or (2) above, sustained by the Contractor or any person, firm or corporation employed by the contractor upon or in connection with the work called for in this agreement, except for the liability resulting from the sole negligence or willful misconduct of the City, its elected officials and their officers, employees and agents who are directly employed by the City and the Consultant; and

(b) any injury to or death of persons or damage to property caused by any fault, neglect, default or omission of the Contractor, or any person, firm or corporation employed by the Contractor, either directly or by independent contract, including all damages due to loss or theft, sustained by any person, firm or corporation, including the City, arising out of, or in any way connected with the work covered by this agreement, whether said injury or damage occurs either on or off City property, provided that any of the foregoing (1) is attributable to personal injury, bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the work itself), including the loss of use resulting there from, and (2) is caused in whole or in part by any act or omission of the Contractor, any subcontractor, any supplier, anyone directly or indirectly employed by any of them or anyone for whose act or omissions any of them may be liable, regardless of whether or not caused in part by any act or omission (active, passive, or comparative negligence included, excepting the active negligence of the District) of a party indemnified hereunder.

(c) The Contractor, at its own expense, cost, and risk shall defend any and all actions, suits or other proceedings that may be brought or instituted against the City, its elected officials, officers, agents and employees and the Consultant, against any such claim, demand or liability, and shall pay or satisfy any judgment that may be rendered against the City, its elected officials, officers, agents or employees, in any such action, suit or other proceedings as a result thereof.

5-15 NO PERSONAL LIABILITY. Neither the City Council, the Engineer, the Consultant, nor any other officer or authorized assistant or agent shall be personally responsible for any liability arising under the contract.

5-16 CONTRACTOR'S RESPONSIBILITY FOR WORK. Except as provided above, until the formal acceptance of the Work by the City, the Contractor shall have the charge and care thereof and shall bear the risk of injury or damage to any part thereof by the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the Work. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof, except such injuries or damages occasioned by act of the federal government or the public enemy.

The City of Redlands shall not be held responsible for the care or protection of any material or parts of the work prior to final acceptance, except as expressly provided in these specifications.

The City shall not be responsible for security of the Contractors equipment or materials at the site. The City will not be responsible for theft or damage to any property or materials of the Contractor. Security for Contractor’s property shall be the responsibility of the Contractor.

5-17 WARRANTY OF WORK. The Contractor shall guarantee the Work against defective materials or workmanship for a period of (1) year from the date of completion date specified in the Notice of Completion, except where longer warranty periods are specifically stated. As specified in Section 2-4 in the GENERAL CONDITIONS, the Performance Bond shall remain in full force and effect during the warranty period.

All work which has been rejected, shall be remedied, or removed and replaced, by the Contractor at his own expense, with work conforming to the Plans and Specifications. Any defective material or workmanship which may be discovered before final acceptance or within (1) one year from the completion date specified in the Notice of Completion shall be corrected immediately by the Contractor at his own expense notwithstanding that it may have been overlooked in previous inspections and estimates. Failure to inspect work at any stage shall not relieve the Contractor from any obligation to perform sound and reliable work as herein described. It is the Contractor's ultimate responsibility to deliver at the time of final acceptance a complete project that complies in all details with these Contract Documents. All items shall be ready to operate.

Any omission or failure on the part of the Owner to discover or notify the Contractor of or to condemn defective work or material at the time of construction shall not be deemed an acceptance, and the Contractor will be required to correct defective work or material prior to final acceptance.

The Owner will endeavor to locate any errors or defective materials or workmanship and call them to the attention of the Contractor prior to subsequent work being performed. However, the Owner is under no obligation to do so and shall not be held liable because errors or defective material or workmanship by the Contractor are not discovered prior to subsequent work.

During the (1) one year warranty period, should the Contractor fail to remedy defective material and/or workmanship, or to make replacements within five (5) days after written notice by the Owner, it is agreed that the Owner may make such repairs and replacement and the actual cost of the required labor and materials shall be chargeable to and payable by the Contractor or his Surety.

Nothing in this section shall be construed to limit the rights of the Owner to immediately correct conditions which may be unsafe or which may pose a public health nuisance. Should said conditions later be found to be caused by defective material and/or workmanship, the Contractor and his Surety shall reimburse the Owner for costs reasonably incurred while attending the situation.

In the event it is necessary for the Owner to file suit to enforce any liability of the Contractor pursuant to this sections WARRANTY OF WORK, the Owner shall be entitled to recover from the Contractor, in addition to all other amounts found due and owing, costs of suit and reasonable expenses and fees, including reasonable attorneys' fees, incurred by the Owner in successfully enforcing the Contractor's obligations, all to be taxed as costs and included in any judgment rendered.

The warranty provided herein shall not be in lieu of, but shall be in addition to any warranties or other obligations otherwise imposed by the Contract Document or by law. The remedies provided herein shall not be exclusive and the Owner shall be entitled to any and all remedies provided by law.

5-18 NOTIFICATION OF RESIDENTS/BUSINESSES. The Contractor shall notify all residents, firms, institutions, agencies, and utility companies which may be affected by the work. Notification shall be by hand delivery of an approved notice within the project limits approved by the City. The notification process shall consist of two notifications, one prior to the start of construction for all properties within the project area and a second notification at least seven days in advance of any activity which may impact each specific property. In the event of any work within the downtown

area, the distribution of the second notification shall be at least fourteen days in advance of any activity. Activities impacting said properties and, therefore, requiring the above said notices include the following: the work itself; closure or partial closure of the street; and disallowance of street parking and disallowance of vehicular ingress to or egress from the property.

Said firms, institutions, agencies, and utility companies which must be notified of proposed work shall include, but are not limited to the following: public schools, private schools, day care centers, postal service, hospitals, governmental services, police department, fire department, ambulance services, Omnitrans, solid waste collection, and City street sweeping.

The proposed notice shall be submitted to the Engineer at least seven calendar days prior to the date of distribution for review and approval. The submittal shall also include a map identifying the limits of the work and proposed limits of distribution. The printed notices shall contain a general description of the work to be done, the name of the street with limits, the day and date of the work and the name and telephone number of the Contractor. The notice shall also include a statement that there will be no disruption of trash collection schedules and that trash should be set out by 6:00 a.m. on the scheduled day of pickup. If on-street parking will be affected the notice shall include a statement that no on-street parking will be allowed between the hours of 7:00 a.m. and 5:00 p.m. on the day of work, and a statement that it will be necessary to tow away parked vehicles at the owner's expense per California Vehicle Code CVC 22651L and CVC 22654D.

The Contractor will provide City with the dates and addresses of when project notifications are delivered to affected properties. City will verify the notification process is completed in compliance with the requirements of the specifications. Work will commence when City approves Contractor’s compliance with the requirements set forth in the specifications.

If on-street parking is affected, the Contractor shall also post pre-approved "NO PARKING-TOW WAY" signs on 1 x 2 wood stakes or barricades at one hundred foot (100’) maximum spacing along the affected areas of the street, 48 hours prior to the start of the work. The "NO PARKING-TOW AWAY" signs shall contain the day, date, and hours that parking will be prohibited on that particular street and a statement that parked vehicles will be towed away at owner's expense per California Vehicle Code CVC 22651L and CVC 22654D. The Contractor shall maintain said signs throughout the day of work, and shall start the removal of said signs by 4:00 p.m. and complete the removal by 6:00 p.m. on said day of work or as otherwise directed by the Engineer.

The Contractor shall document the day, date, and time the signs are installed because the no parking restriction cannot be enforced until the signs have been in place 24 hours. Posting of signs on trees, utility poles, light standards and other existing parkway improvement is strictly forbidden.

In the event of street resurfacing operations, the notices to residents shall contain a statement that the street to be resurfaced will be closed to vehicular traffic, and the suggestion that if they require the use of their vehicles on the day of the resurfacing work, they should consider parking their vehicle on a nearby street which is not scheduled for a resurfacing application.

In the event scheduled work is delayed, the Contractor shall immediately remove all "NO PARKING" signs. The contractor must notify all previously notified, in person and with printed notices, that the

work will be rescheduled and that they will be re-notified 48 hours in advance. The Contractor shall have an adequate supply of approved notifications for distribution to residents.

Full compensation for conforming to these requirements shall be considered as included in the various Contract items of work involved, and no additional compensation will be allowed therefore.

Failure to comply with this section shall result in a penalty assessment imposed of up to $10,000 per violation at the City's discretion.

SECTION 6 – PROSECUTION AND PROGRESS OF THE WORK

6-1 CONSTRUCTION SCHEDULE AND COMMENCEMENT OF WORK. - *Add the following paragraph:*
Contractor shall notify Underground Service Alert (USA) at 1 (800) 227-2600, two working days prior to starting work, and must submit verification number to the City prior to starting work.

6-1.2 Commencement of the Work. - *Amend the second sentence as follows:*
"The work shall start within 10 days thereafter, and be diligently prosecuted to completion within the Contract Time."

6-3 TIME OF COMPLETION.

6-4.1 General. - *Add the following paragraphs:*
If saturated soil is encountered during construction due to leaks in an existing utility, contractor shall remove saturated material and replace with a suitable backfill material until adequate compaction can be attained by verification from the City's Geotechnical Engineer.

Prior to any removal of saturated material, contractor shall discuss the methods of remediation with the City's representative. Approval from the City, or the City's representative, shall be obtained for any amount of saturated material removal in which the contractor anticipates to be compensated for, if approval is not obtained all costs shall be borne by the contractor.

Up to a 14 day delay in paving operations may be requested after all leaks have been resolved to provide time for excess moisture to dissipate, at no additional cost to the city, in lieu of removing and replacing the saturated soil. A no cost change order will be prepared to provide the contractor with additional contract time if such delay is requested by the City.

6-9 LIQUIDATED DAMAGES. The value of liquidated damages noted in this section is amended to five hundred dollars ($500) per working day.

6-10 NOTICE AND SERVICE THEREOF. Any notice required or given by one party to the other under the Contract shall be in writing and shall be dated and signed by the party giving such notice or by duly authorized representative of such party. Any such notice shall not be effective for any purpose whatever unless served in the following manner:

Notice shall be given to the Contractor by personal delivery thereof to said Contractor or to his authorized representative at the project site, or by deposing the same in the United States Mail enclosed in a sealed envelope addressed to said Contractor at the address established for the conduct of work under this Contract, certified and with postage prepaid.

Notice shall be given to the Surety, or any other person, by personal delivery to said Surety or other person, or by depositing the same in the United States Mail, enclosed in a sealed envelope addressed to such Surety or persons at the address of said Surety or persons last communicated by him to the party giving the notice, certified and with postage prepaid.

Notice shall be given to the Owner by personal delivery thereof or by depositing the same in the United States Mail enclosed in a sealed envelope, certified and with postage prepaid. The address of record for the owner is:

City of Redlands
Municipal Utilities & Engineering Department
P.O. Box 3005
35 Cajon Street, Suite 15A
Redlands, CA 92373

6-11 PUBLIC RECORDS ACT. All documents, Plans, specifications and all other information relating to the conduct of the City's business, including information submitted by the Contractor, shall become the exclusive property of the City and except as provided by law shall be deemed public records. Said information shall be subject to the provisions of the California Public Records Act (Government Code Sections 6250 et seq.).

Under no circumstances will the City be responsible or liable to the Contractor, submitter or any other party for the disclosure of any records or information submitted to the City, regardless of whether such records or information are labeled "Trade Secret", "Confidential", or "Proprietary" (or words to similar effect) and regardless of whether the disclosure is required by law or a court order or occurs through inadvertence, mistake, or negligence on the part of the City or its officers, employees, and/or Contractors.

The City will not advise as to the nature or content of documents entitled to protection from disclosure under the California Public Records Act, including interpretations of the Act or the definition of "Trade Secret". The submitting party shall be solely responsible for all determinations made under the Act, and where appropriate for clearly and prominently marking each and every page or sheet of information with "Trade Secret", "Confidential", or "Proprietary". Each submitting party is advised to contact its own legal counsel concerning the California Public Records Act and its applicability to the submitting party's own circumstances.

In the event of litigation concerning the disclosure of any information submitted by the submitting party, the City's sole involvement will be as a stakeholder, retaining the information until otherwise ordered by a court. The submitting party, at its sole expense and risk, shall be responsible for any and all fees and costs for prosecuting or defending any action concerning the information, and shall

indemnify and hold the City harmless from all costs and expenses including attorneys' fees, in connection with such action.

SECTION 7 - MEASUREMENT AND PAYMENT

7-3 PAYMENT.

7-3.2 Partial and Final Payment. - *Delete and replace with the following:*
The closure date for the purpose of making monthly progress payments shall be assigned by the Engineer during the pre-construction meeting. Payment, less deductions, unearned work and retention, will be made within 30 days of the closure date. If a dispute exists between the City and the Contractor regarding an item included in the Contractor's Monthly Progress Payment Request, progress payments will be withheld until said dispute is resolved, in which case longer period of time will be required to make such payment. No such payment shall be required to be made, when in the judgment of the Engineer, the total value of the work since the last estimate amounts to less than $500. If, in the opinion of the Engineer, work is not progressing according to the approved schedule, payments may be withheld until the Contractor returns to the approved schedule.

Deductions will be made for: (1) amounts due the Owner for equipment or material furnished or services rendered; (2) amounts due the Owner under the terms of the Contract; (3) amounts of any claims of lien filed with the Owner; (4) accrued amounts of liquidated damages; (5) amounts required to be deducted by Federal, State or local governmental authorities. From the balance thus determined will be deducted the amounts of all previous payments, and the remainder shall constitute the monthly payment due the Contractor.

A retention of five percent (5%) will be withheld from each and every progress payment to the Contractor. This percentage will remain constant throughout the duration of the Contract. The City shall make a progress payment within thirty (30) days after receipt of an undisputed and properly submitted payment request from Contractor pursuant to Public Contract Code section 20104.50.

After completion of the work to the satisfaction of the Engineer, the Engineer shall make a final estimate of the amount of work done. The City shall pay the entire sum so found to be due after deducting there from all previous payments and all amounts to be retained under the provisions of the Contract. All prior partial estimates and payments shall be subject to correction in the final estimate and payment. The final payment shall not be due and payable until the expiration of thirty-five (35) days from and after the recordation of the Notice of Completion filed by the City.

As provided by paragraph 22300 of the California Public Contract Code, the Contractor may substitute securities for any monies withheld by the City to ensure performance under the Contract. Substitute securities shall be deposited in a financial institution in a form acceptable to the City of Redlands. The financial institution shall be located within the City limits of the City of Redlands. The Escrow Agreement to be used is set forth in Public Contract Code section 22300.

7-3.3 Delivered Materials. - *Delete and replace with the following:*
No payment will be made for materials or equipment delivered but not yet incorporated in the work.

7-4.2.6 Extras. Without invalidating the Contract, the City may order extra work or make changes by altering, adding or deducting from the work, the Contract sum being adjusted accordingly and the consent of the Surety being first obtained where necessary or desirable. All the Work of the kind bid upon shall be paid for at the price stipulated on the proposal, and no claims for any extra work or material shall be allowed unless the work is ordered in writing by the engineer and the price is stated in such order.

7-4.2.7 Claims for Extra Costs. No claim for extra work or cost shall be allowed unless the same was done in pursuance of a written order by the Engineer, as aforesaid, and the claim presented with the first estimate after the changed or extra work is done. When work is performed under the terms of the General Conditions, the Contractor shall furnish satisfactory bills, payrolls, and vouchers covering all items of cost and when requested by the City, give the City access to accounts relating thereto.

After completion of the work to the satisfaction of the Engineer, the Engineer shall make a final estimate of the amount of work done. The City shall pay the entire sum so found to be due after deducting there from all previous payments and all amounts to be retained under the provisions of the Contract. All prior partial estimates and payments shall be subject to correction in the final estimate and payment. The final payment shall not be due and payable until the expiration of the thirty-five (35) days from and after the recordation of the Notice of Completion filed by the City.

SECTION 8 - FACILITIES FOR AGENCY PERSONNEL

This section is deleted in its entirety.

SECTION 9 - ASSIGNMENT OF UNFAIR BUSINESS PRACTICES CLAIMS

9-1. In entering into a public works contract or a subcontract to supply goods, services, or materials pursuant to a public works contract, the Contractor or subcontractor offers and agrees to assign to the City all rights, title and interest and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2, commencing with section 16700 of part 2 of division 7 of the Business and Professions Code), arising from the purchase of goods, services, or materials pursuant to this public works agreement. This assignment shall be made and become effective at the time the City tenders final payment to the Contractor, without further acknowledgment by the Parties.

SECTION 10 - TRENCHING AND EXCAVATION

10-1. If this contract involves digging trenches or other excavations that extend deeper than (4) feet below the surface, the following shall be done pursuant to California Public Contract Code Section 7104:

A. That the Contractor shall promptly and before the following conditions are disturbed, notify the City in writing, of any:

(1) Material that the Contractor believes may be material that is hazardous waste, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II or Class III disposal site in accordance with provisions of existing law.

(2) Subsurface or latent physical conditions differing from those indicated.

(3) Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the contract.

B. That the City shall promptly investigate the conditions, and if it finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of work shall issue a change order under the procedures described in the contract.

C. That, in the event that a dispute arises between the City and the Contractor whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the Contractor cost of, or time required for, performance of any part of the work, the Contractor shall not be excused from any scheduled completion date provided for by the contract, but shall proceed with all work to be performed under the contract. The Contractor shall retain any and all rights provided either by contract or by law which pertains to the resolution of disputes and protests between the contracting parties.

SECTION 11 - REMOVAL, RELOCATION OR PROTECTION OF EXISTING UTILITIES

11-1. Pursuant to Government Code Section 4215 et seq, the City shall assume the responsibility between the parties to this contract, for the timely removal, relocation, or protection of existing main or trunk line utility facilities located on the site of the construction project for this contract, if such utilities are not identified by the public agency in the plans and specifications made a part of the invitation for bids.

11-2. The Contractor shall be compensated for the costs of locating, repairing damage not due to the failure of the Contractor to exercise reasonable care, and removing or relocating such utility facilities not identified in the plans and specifications with reasonable accuracy and for equipment on the project necessarily identified during such work.

11-3. The Contractor shall not be assessed liquidated damages for delay in completion of the project, when such delay was caused by the failure of the City, or the owner of the utility to provide for removal or relocation of such utility facilities.

11.4. The City shall not be required to indicate the presence of existing service laterals or appurtenances whenever the presence of such utilities on the site of the construction project can be inferred from the presence of other visible facilities, such as buildings, meter and junction boxes, on adjacent to the site of construction, provided, however, nothing herein shall relieve the City from identifying main or trunk lines in the plans and specifications.

11.5. Nothing herein shall preclude the City from pursuing appropriate remedy against the utility for delays which are the responsibility of the utility.

11.6. If the Contractor, while performing the contract, discovers utility facilities not identified by the City in the contract plans or specifications, Contractor shall immediately notify the City and the utility in writing.

11.7. The public utility, when it is the owner, shall have the sole discretion to perform repairs or relocation work or permit the Contractor to do such repairs or relocation work at a reasonable price.

11.8. Contractor shall comply with Government Code Section 4216 through 4216.9.

11.9. Conduits from existing street light and traffic signal systems may be encountered during construction of this project. All removals, relocations, and/or replacements of existing conduit systems shall be performed in accordance with these specifications and City standards, by a qualified electrical contractor. All costs for said work shall be borne by the Contractor and paid as a part of the various items of work requiring such removals, relocations, and/or replacements, and no other compensation shall be made therefore.

SECTION 200 - ROCK MATERIALS

200-2 UNTREATED BASE MATERIALS.

200-2.1 General. - *Amend the first paragraph as follows:*
"Materials for use as untreated base or subbase shall be classified in the order of preference as follows:
Crushed Aggregate Base
Crushed Miscellaneous Base
Pulverized Miscellaneous Base."

200-2.4.1 General. - *Delete the second sentence and replace with the following:*
"The material shall be free of deleterious material as defined in 200-1.1."

200-2.4.2 Grading. - *Amend the first sentence of paragraph 1 as follows:*
"The material shall be uniformly graded and shall conform to the 'fine' gradations:"

200-2.5.1 General. - *Delete the third sentence and replace with the following:*
"The material shall be free of deleterious material as defined in 200-1.1."

200-2.8.1 General. - *Amend as follows:*
Delete the second sentence of paragraph 1 and replace with the following:
"Pulverized miscellaneous base may contain underlying base material."

Delete the third sentence of paragraph 1 and replace with the following:
"The material shall be free of deleterious material as defined in 200-1.1."

SECTION 201 - CONCRETE, MORTAR AND RELATED MATERIALS

201-1 PORTLAND CEMENT CONCRETE.

201-1.1.1 General - *Add the following paragraph:*
The Contractor shall furnish the Engineer in the field with a copy of the mix design to be used, and with a legible certified weighmaster's certificate for each load of PCC delivered to the project. PCC delivered to the project site having a water content and/or slump greater than that specified in the mix design, shall be rejected and removed from the project site.

201-1.1.2 Concrete Specified by Class and Alternate Class - *Amend Table 201-1.1.2.(A) as follows:*

Street Surface Improvements section -
All concrete in this section shall have a minimum compressive strength at 28 days of 22,410 kPa (3,250 pounds per square inch), and meet the requirements of class 330-C-23 (560-C-3250) concrete.

Sewer & Storm Drain Facilities section, Sidehill Surface Drainage Facilities subsection -
All concrete in this subsection shall have a minimum compressive strength at 28 days of 22,410 kPa (3,250 pounds per square inch), and meet the requirements of class 330-C-23 (560-C-3250) concrete.

201-1.4.3 Transit Mixers. - *Replace the first sentence in paragraph 6 with the following:*
The total elapsed time between addition of water at the batch plant and the completion of the discharge of the PCC from the mixer, shall not exceed ninety (90) minutes. All PCC remaining in the mixer, after said ninety (90) minutes time limit, shall be rejected and removed from the project site.

SECTION 203 - BITUMINOUS MATERIALS

203-3 EMULSIFIED ASPHALT.

203-3.1 General. - *Modify the section by adding the following:*
Asphalt emulsion shall be a QUICKSET ANIONIC OR CATIONIC EMULSIFIED ASPHALT conforming to the requirements of Subsection 203-1.3, "Test Reports and Certification", and Subsection 203-1.2, "Testing Requirements" of the Standard Specifications.

The latex additive shall be Ultra Pave 70 (for anionic) or Ultra Pave 65 K (for cationic) or an approved equal. The latex shall be added at the emulsion plant after weighing the asphalt and before the addition of mixing water. The latex shall be added at a rate of two to two-and-one-half (2 to 2.5) parts to one-hundred (100) parts of emulsion by volume.

203-5 SLURRY SEAL.

203-5.1 General. - *Delete the sentence and replace with the following:*
Slurry seal shall be emulsion-aggregate slurry (EAS) conforming to 203-5.4.

203-5.2 Mix Design. - *Modify the section by adding the following:*

(f) Admixtures, such as Portland Cement or aluminum sulfate may be mixed into the slurry material to adjust curing time such that the applied slurry can support vehicular traffic within 60 minutes.

(g) Use of slag shall not be permitted.

(h) Deliveries of aggregate and emulsion shall not be made without the engineer present. Emulsion is not to be transferred to an on-site storage tanker without the sieve test performed by the City.

203-5.3.2 Grading. - *Delete the sentence and replace with the following:*
The combined aggregate gradation shall be determined in accordance with ASTM C136 and conform to Type II requirements shown in Table 203-5.3.2 (A).

203-5.4.1 General. – *Modify the paragraph and replace with the following:*
EAS shall be a stable mixture of emulsified asphalt, aggregate, water, a set control agent, and latex. EAS shall be Type II-CQS-1h-EAS.

203-5.4.2.1 Aggregate. – *Delete the sentence and replace with the following:*
Aggregate shall be Type II conforming to 203-5.3.

203-5.4.2.2 Emulsified Asphalt. – *Modify the first paragraph and replace with the following:*
Emulsified asphalt shall be quick-set, and contain latex. Quick-set emulsified asphalt shall be CQS-1h conforming to 203-3.

203-6 ASPHALT CONCRETE.

203-6.1 General. - *Add the following paragraph:*
Unless otherwise approved by the Engineer, asphalt concrete for paving shall be C2-PG 64-10 (1/2") for finish paving or B-PG 64-10 (3/4") for base paving. Asphalt concrete for Type D1 or Type D2 curb shall be D2 –PG 70-10.

SECTION 206 - MISCELLANEOUS METAL ITEMS

206-7 TRAFFIC SIGNS.

206-7.1 General. The Contractor shall furnish or relocate and erect all traffic signage as required and specified.

All new traffic signage shall be a minimum of the encapsulated lens (high intensity) type, have an anti-graffiti protective covering and be installed on new posts. All traffic signage to be relocated shall be installed on new posts.

206-7.2 Protective Covering. Anti-graffiti protective covering shall be Type 1150-POF, manufactured by 3M Company, or approved equal.

206-7.3 Post and Base. New posts and bases shall be Ultimate Sign Support System as manufactured by Western Highway, or approved equal.

SECTION 207 – GRAVITY PIPE

207-2 REINFORCED CONCRETE PIPE (RCP).

207-2.1 General. - *Add the following sentences to paragraph 2:*
The minimum D-load for any RCP shall be 1,350. The minimum size for RCP shall be 18 inches (457 mm) unless otherwise approved by the Engineer.

SECTION 211 - MATERIAL TESTS

211-1 COMPACTION TESTS.

211-1.4 General. The Contractor shall be responsible for all quality control for all work. The Contractor shall complete all necessary testing to ensure the quality requirements within the specifications are achieved. The Contractor shall conduct the compaction testing by a geotechnical engineering firm and the results of the testing shall be made available to the Engineer.

The City will complete assurance testing throughout the project by an independent testing firm. The City will perform the first compaction test required at any location. If such test does not meet the required specifications, the City will make additional tests until the required compaction is obtained and withhold from the final payment due the Contractor, the cost of all such additional tests. To be acceptable, tests must be ordered and witnessed by the City. Tests will be ordered by the City and performed at a location and depth as directed by the City. The Contractor shall assist the City in performing these tests as necessary. The Contractor shall provide to the City the maximum dry density and the optimum moisture content results of backfill and bedding material when requested by the City.

SECTION 214 - TRAFFIC STRIPING, CURB AND PAVEMENT MARKINGS, AND PAVEMENT MARKERS

214-4 PAINT FOR STRIPING AND MARKINGS.

214-4.1 General. - *Amend the first sentence in paragraph 4 as follows:*
"Glass beads conforming to 214-3 shall be mechanically applied at a rate of 0.6 to 0.8 kg of beads per liter (5 to 7 pounds of beads per gallon)."

SECTION 300 - EARTHWORK

300-1 CLEARING AND GRUBBING.

300-1.1 General. - *Amend as follows:*

Amend paragraph 3 as follows:
"The natural ground surface shall be cleared of all vegetable growth, such as trees, logs, upturned stumps, roots of downed trees, brush, grass, weeds, shrubs, ground cover, tree stumps, decorative landscape rocks, edging, railroad ties, other decorative landscape treatments, boulders, rock, portland cement concrete, and all other objectionable materials, within the limits of construction."

Add the following paragraphs:
Grubbing and removal of organic debris shall include the repair and/or replacement of all parkway irrigation piping and systems necessary to perform work on this Contract and capping pipelines until such time that permanent repairs and/or replacements have been made.

All debris removed from the project site under this item shall be disposed of at an approved dump site. All transportation costs and dump fees shall be borne by the Contractor.

Clearing and Grubbing shall include, but is not limited to, the following:

1. Removal of existing AC berms.

2. Removal of all curb and gutter, cross gutters, and spandrels shall be replaced within three (3) calendar days. The Asphalt Concrete patch for areas with curbs and gutters removed and replaced shall be placed within two (2) working days after the curb and gutter, cross gutters, and spandrels are replaced. Removal of all sidewalks shall be replaced within three (3) calendar days.

3. Saw cut and removal of poles, posts, PCC pavements, curb, gutter, and sidewalk. Holes resulting from removal of existing poles and posts from existing PCC, AC pavements and curbs and gutters, shall be filled or patched with like materials. Self-propelled drop hammers will not be allowed for removals.

4. Removal of all raised pavement markers not conforming to the approved plan or conflicting with the proposed striping as shown on the plans in accordance with Subsection 312-3, Removal, of the Standard Specifications.

5. Removal and disposal of boulders, rock or PCC.

6. All trees and shrubs less than 3m (9 ft) directly above the entire sidewalk surface shall be trimmed and removed by the contractor to allow a clear path of travel for pedestrians.

7. Irrigation system relocation:

Any irrigation systems in conflict with the proposed improvements that are removed, damaged, disturbed, or broken shall be modified, repaired, and/or replaced to be operable and provide full irrigation coverage to the areas requiring irrigation using new materials, equal or better than the original materials, with 20 mm (3/4 in) Schedule 40 PVC being the minimum acceptable for underground lines and 13 mm (1/2 in) Schedule 80 being minimum acceptable for risers and with the systems not being out of operation for more than two (2) days. No payment for work associated with the irrigation repair will be released, until all irrigation is complete, operable and accepted by the City.

All trees, shrubbery and lawns deprived of normal irrigation watering due to a disruption of service caused by the Contractor's operations shall be regularly and thoroughly irrigated by the Contractor so that said plantings will not be damaged. If any trees, shrubbery or lawns die or suffer unacceptable damage as a result of or precipitated by the Contractor's operations the Contractor shall replace same with the same plant species and size. Existing grass lawns within areas that must be excavated and/or re-graded shall be cut into approximate 305 mm (1 ft) squares, removed, protected, cared for and replaced as soon as possible. Dead, dying, and unacceptably damaged grass shall be replaced with new grass sod.

8. Existing inlets, slotted drains, drainage pipes, concrete gutters, drainage pipes, where any portion of such structure is within 1m of the grading plane in the excavation areas, or within 300 mm (1 ft) of original ground in embankment areas, or where shown on the plans to be removed, shall be completely removed and disposed of accordingly.

9. Removal and disposal of existing drainage inlet structure and PCC or AC apron.

10. The Contractor shall dispose all materials not being salvaged outside of the right-of-way and shall pay for all costs for disposal.

11. Removal and disposal of any abandoned utilities that may interfere with the improvements.

12. Self-propelled drop hammers will not be allowed for removals.

300-1.3.1 General. - *Add the following paragraphs:*
The Contractor shall dispose portland cement concrete, stone rubble, and brick at an approved dump site.

All reprocessed asphaltic cement concrete may be placed as the lower course of crushed aggregate base material. If the Contractor chooses not to reprocess the material, disposal at an approved dump site shall be required. All costs for disposal shall be borne by the Contractor. If the Contractor chooses to reprocess material, it shall be protected and remain contaminate-free, otherwise disposal at an approved dump site will be required with all costs borne by the Contractor.

All reprocessed asphaltic cement concrete to be used as crushed aggregate base shall be ground to conform to Section 200-2.2.

300-1.3.2 (a) Bituminous Pavement. - *Amend the following:*

Amend the second sentence as follows:
"Saw cutting of edges to be joined shall be with a power-driven saw. The groove shall be cut to a minimum depth of 4 inches (102 mm)."

Amend the third sentence as follows:
"Where bituminous pavement is to be removed, a cold mill header cut of maximum 6 feet (1.8 m) in width perpendicular to the join line shall be made, and a minimum laying depth of 1 inch (25mm) of new pavement material shall be provided at the join line."

Amend the fourth sentence as follows:
"The edges of existing concrete pavement adjacent to the trench shall be saw cut to neat straight lines for the purpose of removing the damaged pavement areas."

Add the following sentence:
Work under this item shall include asphalt concrete berms.

300-1.3.2 (b) Concrete Pavement. - *Amend the following:*

Amend the second sentence as follows:
"Saw cuts shall be made to a minimum depth of 4 inches (102 mm)."

Amend the third sentence as follows:
"If a saw cut in concrete pavement falls within 5 feet (1.5 m) of a construction joint, cold joint, expansion joint, or edge, the concrete shall be removed to the joint or edge."

300-1.3.2 (c) Concrete Curb, Walk, Gutters, Cross Gutters, Driveways and Alley Intersections. - *Amend the following:*
Amend the first sentence as follows:
"Concrete shall be removed to neatly sawed edges with saw cuts made to a minimum depth of 4 inches (102 mm)."

Amend the third sentence as follows:
"No section to be replaced shall be smaller than 36 inches (1 m) in either length or width."

Amend the fourth sentence as follows:
"If the saw cut in sidewalk or driveway would fall within 36 inches (914 mm) of a construction joint, expansion joint, or edge, the concrete shall be removed to the joint or edge, except that where the saw cut would fall within 12 inches (300mm) of a score mark, the saw cut shall be made in and along the score mark."

Amend the fifth sentence as follows:
"curb and gutter shall be sawed to a depth of 4 inches (102 mm) on a neat line at right angles to the curb face."

300-1.3.2 (d) Striping and Markings. All existing striping, markings and raised pavement markers shown to be removed or necessary to be removed from paving areas. This item includes removal in compliance with applicable laws and cleanup of residue from the operation.

All striping, markings and raised pavement markers removed beyond the limits shown on the plans for and/or at the convenience of the Contractor shall be replaced at the Contractor's expense.

300-1.3.2 (e) Structures. All existing concrete structures (reinforced or non-reinforced) as shown on the plans to be removed or abandoned, including but not limited to, undersidewalk drains, manholes, headwalls, bulkheads, drop inlet structures, energy dissipaters, catch basins, vaults and pipelines. Abandonment shall include all cuts and concrete plugs necessary to seal ends or openings of abandoned pipes or structures.

300-1.3.2 (f) Rock Curbs. All rock from rock curb removals, as shown on the plans or required for construction of the project, shall be transported, delivered and unloaded at a storage site as directed by the Engineer.

300-1.3.2 (g) Miscellaneous Removals. All other removals of facilities, as shown on the plans but not covered under separate bid items, and any underground facilities found during the work and not shown on the plans shall be performed. The City has endeavored to show all known underground facilities but is not responsible for unknown or abandoned facilities. Unknown underground facilities shall be paid as extra work.

300-1.3.2 (h) Miscellaneous Relocations. All relocation work as shown on the plans or required for construction of the project, but not covered under separate bid items, shall be included as a part of Subsection 300-1 Clearing and Grubbing. All relocation work performed as a part of clearing and grubbing work shall conform to the requirements and specifications of the agency or utility having jurisdiction over the item to be relocated.

300-1.4 Payment. - *Add the following sentence to paragraph 1:*
Payment for work on this item shall be made as a percentage of the work completed at each monthly payment.

300-2 UNCLASSIFIED EXCAVATION.

300-2.2.2 Wet Material. - *Amend the second sentence of the paragraph:*
"If such high moisture content is not the result of any action on the part of the Contractor, or inaction in protecting the work during the course of the contract, the work involved will be paid for in the following manner: Over-excavation and disposal work shall be considered "extra work," with backfill and compaction of crushed aggregate base paid under the appropriate bid item in these specifications."

300-12 MISCELLAENOUS GRADING. The parkway, whether landscaping exists or not, shall be graded and compacted to achieve drainage towards the street at a slope of 2%. Grading shall be coordinated such that it is the last item of work to be completed, prior to site clean-up. Loose material and dirt shall be raked, compacted and distributed throughout the parkway area. Areas

adjacent to installed improvements must be graded to a level within one inch from the finished surface. Extra dirt/fill shall be removed from the project in accordance with Specifications.

The Contractor, at his expense shall photo-document pre-construction conditions prior to starting excavating. After construction is completed, the Contractor shall photo-document the finished grade. The Contractor shall provide the City with said photos with addresses identifying each property location, the direction the photograph was taken (facing North, South etc). The Contractor shall keep a copy of the photos (either electronically or hard copy) and provide the City with electronic copies of the photos.

SECTION 301 - TREATED SOIL, SUBGRADE PREPARATION AND PLACEMENT OF BASE MATERIALS

301-1 SUBGRADE PREPARATION.

301-1.3 Relative Compaction. - *Amend the second sentence of paragraph 1 as follows:*
"When base material, curb, gutter, alley pavement, driveways, or sidewalks are to be placed on the subgrade material, the top 6 inches (150mm) of such subgrade material shall be compacted to a relative compaction of 95 percent."

301-2.1 General. – *Add the following paragraphs:*
The contractor shall use 'crushed aggregate base' or 'crushed miscellaneous base, fine graded' as the base material. The use of 'processed miscellaneous base,' 'select subbase,' or 'disintegrated granite' shall not be used as base material.

The contractor may use 'pulverized miscellaneous base' (grindings) as part of the crushed base material. Said grindings shall be uncontaminated and placed in an even thickness as the lower course of crushed base material. Spreading and compacting shall comply with Sections 301-2.2 and 301-2.3.

301-2.3 Compacting. – *Amend the second sentence of paragraph 3 as follows:*
"Compaction in the excepted areas shall be as specified in 211-1 with each layer of compacted base material having a minimum relative compaction of 95 percent."

301-2.4 Measurement and Payment. – *Add the following paragraph:*
Payment shall be made for cold-planing, storing, placing, and compacting reprocessed asphalt concrete pavement (grindings) as part of the crushed aggregate base (CAB) material. The volume of grindings placed shall be figured and a tonnage figure computed using 9.35 kg/m^3 (150 pounds per cubic foot). This tonnage figure shall be paid as part of the crushed aggregate base tonnage for this project.

301-7 FULL DEPTH RECLAMATION WITH MECHANICAL STABILIZATION (FDR-25)

301-7.1 Description. This rehabilitation alternative consists of pulverizing the existing asphalt concrete (AC) layer along with the underlying unbound material to a depth of 6, 9 or 12 inches per

plan and specifications. The properties of this layer are considered to be similar to an Aggregate Subbase material with a modulus of at least 25 ksi.

The manufacture of the recycled base course shall be done in-place by pulverizing and blending the existing AC layer and base materials, if present. The process shall be accomplished in accordance with these specifications and conform to the lines and grades shown in the plans or as established by the engineer.

301-7.2 Construction. The asphalt concrete surfacing and underlying base materials shall be pulverized such that 100 percent of the material will pass a two-inch sieve and a minimum of 90 percent will pass a one and one-half inch sieve. All materials other than rock and pulverized asphalt concrete shall be broken up such that these materials will pass a one inch sieve. The pulverized materials shall be free of roots, weeds, wood, and construction debris. All grass and other vegetation shall be removed from the edge of the exiting pavement or lip of gutter pan to prevent contamination of the pulverized bituminous material during the milling operation.

Trimming and disposal of excess material, if required, will be performed on the intimate mixture of pulverized asphalt concrete, base materials and subgrade soil. Excess pulverized material is the surplus that results after trimming and grading the pulverized pavement section to the lines and grades matching existing and/or per plans and specifications.

Do not start pulverized roadbed activities if the ambient air temperature is below 40F. If the ambient air temperature falls below 40F, you may only compact and finish pulverized roadbed. Before starting daily pulverized roadbed activities, sweep the pulverized roadbed area constructed the previous day to remove loose material.

301-7.3 Surface Preparation. Before pulverized roadbed activities start, prepare the existing roadway surface by:

1. Clearing foreign matter including vegetation
2. Removing standing water
3. Referencing the profile and cross slope
4. Marking the proposed longitudinal cut lines on the existing pavement as follows:
   4.1. Cut lines must coincide with points where the existing cross slope changes, approximately at the centerline and edge of traveled way
   4.2. Cut lines must indicate the sequence of the cuts
5. Referencing existing lane lines and striping layout

Final subgrade surface shall slope away from the street centerline to a maximum of 3% grade. Pulverized asphalt material must be used as base material to meet new cross slope requirements. Native sub-grade material may need to be hauled off to allow for the use of all pulverized base material. No additional compensation will be allowed for any sub-grade removal and haul-off if required. Any contaminated material will be removed and disposed of by the contractor off site at his expense. Any shortage of material, caused by premature disposal of the indicated surplus material by the contractor, shall be replaced by it and no additional compensation will be allowed for such replacement.

301-7.4 Spreading, Mixing, and Compacting. Do not use a heating device to soften the pavement. Remove any visible oversized materials in the pulverized roadbed mixture prior to shaping and compacting. If you encounter unstable subgrade or rocks greater than 4 inches in the roadway section, notify the Engineer. The Engineer determines the extent of the unsuitable material and the corrective measures to be taken.

According to the Section 301-2.3, the compaction shall always be commenced along the edge of the area to be compacted and the roller shall gradually advance toward the center of the area to be compacted. Rollers shall be operated along lines parallel or concentric with the centerline of the road being constructed, and no material variation therefrom will be permitted. All rollers must be maintained in good mechanical and working condition.

The relative compaction of each layer of compacted base material shall not be less than 95 percent. ASTM D2922, Methods of Density of Soil and Soil Aggregate in Place by Nuclear Methods, (or ASTM D1556). After compaction, the sub-grade shall be firm, and unyielding.

301-7.5 Finishing. The finished pulverized roadbed surface must not vary more than 0.05 foot from the lower edge of a 12-foot straight edge laid in directions parallel and perpendicular to the centerline. Variations within the above specified tolerances shall be compensating so that the average grade and cross section specified are met. The finished surface must be free from segregation, tearing, and scarring, and have a uniform surface texture throughout the work limits.

301-8 FULL DEPTH RECLAMATION WITH CEMENT STABILIZATION (FDR-200)

301-8.1 Description. This rehabilitation alternative consists of pulverizing the existing asphalt concrete (AC) layer along with the underlying unbound material to a depth of 6, 9 or 12 inches per plan and specifications. The properties of this layer are considered to be similar to an Aggregate Subbase material with a modulus of at least 200 ksi.

The manufacture of the recycled base course shall be done in-place by pulverizing and blending the existing AC layer and base materials, if present, and adding cement. Micro-cracking of the completed cement stabilized surface is required before HMA is to be placed directly on top of the cement treated surface, regardless of the AC thickness. The process shall be accomplished in accordance with these specifications and conform to the lines and grades shown in the plans or as established by the engineer.

The cement content must be 2% by dry weight of FDR with cement with a dry unit weight of 130 lb/cu ft for 6” FDR section. The cement content must be 3% by dry weight of FDR with cement with a dry unit weight of 130 lb/cu ft for 9” FDR section. The cement content must be 4% by dry weight of FDR with cement with a dry unit weight of 130 lb/cu ft for 12” FDR section. Cement must be Type II or Type V Portland cement specified in ASTM C 150/150M.

301-8.2 Construction. The asphalt concrete surfacing and underlying base materials shall be pulverized such that 100 percent of the material will pass a two-inch sieve and a minimum of 90 percent will pass a one and one-half inch sieve. All materials other than rock and pulverized asphalt

concrete shall be broken up such that these materials will pass a one inch sieve. The pulverized materials shall be free of grass and vegetation, and construction debris to prevent contamination of the pulverized materials. Mixing shall continue until, and at the speed of the recycling unit adjusted to ensure, a homogenous mixture of the above materials and pulverized materials are achieved.

Trimming and disposal of excess material, if required, will be performed on the intimate mixture of pulverized asphalt concrete, base materials and subgrade soil. Excess pulverized material is the surplus that results after trimming and grading the pulverized pavement section to the lines and grades matching existing and/or per plans and specifications. Excess pulverized material shall consist of non-treated well mixed pulverized AC pavement and subgrade.

Do not start pulverized roadbed activities if the ambient air temperature is below 40F. If the ambient air temperature falls below 40F, you may only compact and finish pulverized roadbed. Before starting daily pulverized roadbed activities, sweep the pulverized roadbed area constructed the previous day to remove loose material.

301-8.3 Surface Preparation. Before pulverized roadbed activities start, prepare the existing roadway surface by:

1. Clearing foreign matter including vegetation
2. Removing standing water
3. Referencing the profile and cross slope
4. Marking the proposed longitudinal cut lines on the existing pavement as follows:
    4.1. Cut lines must coincide with points where the existing cross slope changes, approximately at the centerline and edge of traveled way
    4.2. Cut lines must indicate the sequence of the cuts
5. Referencing existing lane lines and striping layout

Final pavement surface shall slope away from the street centerline to a maximum of 3% grade. Pulverized material must be used as base material to meet new cross slope requirements. Native sub-grade material may need to be hauled off to allow for the use of all the pulverized base material. No additional compensation will be allowed for any sub-grade removal and haul-off if required. Any contaminated material will be removed and disposed of by the contractor off site at his expense. Any shortage of material, caused by premature disposal of the indicated surplus material by the contractor, shall be replaced by it and no additional compensation will be allowed for such replacement.

301-8.4 Spreading, Mixing, and Compacting. Do not use a heating device to soften the pavement. Remove any visible oversized materials in the pulverized roadbed mixture before shaping and compacting. If you encounter unstable subgrade or rocks greater than 4 inches in the roadway section, notify the Engineer. The Engineer determines the extent of the unsuitable material and the corrective measures to be taken.

Recycling shall be performed to the depth provided in the plans, while incorporating stabilizing agents, mineral filler, additional aggregate and water. Mixing shall continue until, and the speed

of the recycling unit adjusted to ensure, a homogenous mixture of the above materials and pulverized materials is achieved. Pre-cutting, grading and light compacting of the recycled material shall be performed prior to incorporation of the stabilizing. Spread cement uniformly over the full roadway surface width. Do not spread cement more than 30 minutes before mixing. Do not apply dry cement in windy conditions that will result in dust outside the FDR with cement area. The application rate must be the mix design rate or the ordered application rate in lb/sq yd ± 0.5 percent. The application rate of all stabilizing agents shall be continuously monitored. If the measured application rate falls outside the above tolerance, then the recycling operations shall be stopped and corrected before proceeding. Do not spread cement and aggregate before pulverizing.

Water must be injected through the pulverizing machine. The injection rate of mixing water must be sufficient to produce the FDR with cement material mixing moisture content. The water content of the stabilized material shall be monitored closely to ensure proper compaction. Mark where the center of the pulverizing drum stops. Start the following cut on this alignment at least 2 feet behind the mark. Before compacting, remove solids larger than 3 inches in any dimension by hand.

Immediately after pulverizing and mixing, compact FDR with cement to the minimum relative compaction. Do not allow more than 2 hours between final mixing of the pulverized material with cement and completion of initial compaction before trimming. During grading and final compaction add water to maintain the mixing moisture content as described in the mix design. Do not allow more than 2 hours to elapse from the time water is added to the aggregate and cement to completion of final compaction after trimming.

Longitudinal joints between adjacent stabilization passes shall be overlapped at least 4 inches. Transverse joints between the recycling process shall be saw-cut, if necessary, to provide a vertical clean face to ensure proper compaction. Compaction of cementitious stabilizer begins within 20 minutes after mixing and achieving gradation and moisture requirements.

According to the Section 301-2.3, the compaction shall always be commenced along the edge of the area to be compacted and the roller shall gradually advance toward the center of the area to be compacted. Rollers shall be operated along lines parallel or concentric with the centerline of the road being constructed, and no material variation therefrom will be permitted. All rollers must be maintained in good mechanical and working condition.

The relative compaction of each layer of compacted base material shall not be less than 95 percent. ASTM D2922, Methods of Density of Soil and Soil Aggregate in Place by Nuclear Methods, (or ASTM D1556). After compaction, the sub-grade shall be firm, and unyielding.

Construction joints shall have vertical faces and shall be made in thoroughly compacted material. Additional mixture shall not be placed against the construction joint until the joint has been approved by the Engineer. The face of the cut joint shall be lean and free of deleterious material and shall be kept moist until the placing of the adjacent FDR with cement.

301-8.5 Finishing. Once the entire working width (full lane width plus effected shoulder width) has been stabilized, and only after primary compaction has been completed, the entire working

width shall be graded to the required profile and cross-slope. Disturbance to the stabilized and primary compacted material shall be kept to a minimum during this grading and shaping operation.

The finished pulverized roadbed surface must not vary more than 0.05 foot from the lower edge of a 12-foot straight edge laid in directions parallel and perpendicular to the centerline. Variations within the above specified tolerances shall be compensating so that the average grade and cross section specified are met. The finished surface must be free from segregation, tearing, and scarring, and have a uniform surface texture throughout the work limits.

Immediately after compaction, apply water and roll with no vibration. The finished surface must be free of ruts, bump, indentations, segregation, raveling, and any loose material.

The completed cement treated subgrade shall be moist cured continuously until it is in a firm and unyielding condition. The cement treated subgrade shall be kept free from heavy traffic during the curing period or until the asphalt concrete surfacing is placed whichever is less, unless otherwise directed by the Engineer. Moisture curing shall be the only method of curing prior to micro-cracking.

Micro-cracking shall be performed with several vibratory roller passes 48 to 72 hours after finish grading to prevent severe, wide cracks from forming thus reduces the potential for reflective cracking through the HMA layer. Micro-cracking shall be performed before the application of asphaltic emulsion curing seal. After micro-cracking is complete additional moisture curing may be used. Any additional water required to achieve maximum density shall be applied by spraying the surface of the stabilized material with light applications. Care shall be taken so as not to over-apply additional water to any areas of the stabilized material.

While open to traffic and before placing HMA, maintain the FDR with cement surface free of ruts, bumps, indentations, raveling, and segregation. If FDR with cement material is damaged, it shall be repaired by removing and replacing the entire depth of affected layers in the damaged area. Feathering will not be permitted for repair of low areas.

Asphaltic emulsion curing seal must be applied on the completed cement treated base immediately before placing HMA. Asphaltic emulsion curing seal must comply with Caltrans Standard Section 94, Grade SS1 or CSS1. Dilute and thoroughly mix asphaltic emulsion for curing seal at a ratio of 1 part water to 1 part asphaltic emulsion. The water must no cause premature separation of the emulsion. Uniformly apply the diluted curing seal at a rate of 0.1 gal/yd2 of cement treated base surface.

SECTION 302 - ROADWAY SURFACING

302-4 SLURRY SEAL SURFACING.

302-4.3.1 General. – *Add the following paragraphs:*
All slurry mixing machines shall be equipped with a Fines Feeder for the adding of cement or granular Aluminum Sulfate.

Prior to the beginning of slurry operations, the Contractor shall furnish, at no cost to the City, current licensed weigh master's certificates indicating the net weight capacity of the aggregate bin. The Contractor shall provide a drive upon scale at the project site or an alternate site approved by the City. The drive on scale shall show the net weight of the aggregate bin on each slurry machine before the machine and product will be approved for applying slurry on the project.

All slurry machines are to carry, at all times, a calibrated emulsion measuring stick. The emulsion measuring stick is to be calibrated in 10-gallon increments to the slurry machine it is used on. Emulsion measuring sticks from other slurry machines will not be allowed to measure the gallons of emulsions on the slurry machines they were not calibrated to. The emulsion measuring stick is to have the slurry machine number or identification permanently marked on the stick. The gallons of emulsion are to be measured with a calibrated emulsion measuring stick and recorded before leaving and after returning to materials site. Use of a slurry machine will not be allowed if it does not have a calibrated emulsion measuring stick.

The Contractor shall furnish prior commencing work, a calibrated stick in 10-gallon increments to measure the oil in the trailer storage tanks in gallons. The measuring stick shall be calibrated to the trailer storage tank it is used on. The inspector shall check the oil in each load "in and out" and in the storage tanks at the beginning and end of each day to determine the amount of emulsion used for that day. Emulsion is not to be transferred from delivery tank to on-site storage tank before the City performs the sieve analysis on the emulsion. Aggregate used in the slurry shall not exceed a moisture content of four percent (4%) by weight of dry aggregate.

Contractor may not schedule more than 150 tons of slurry to be placed per day. Slurry may not be applied at more than 150 feet per minute.

The Contractor shall provide a self-propelled 10 ton pneumatic roller with a tire pressure of 50 PSI and equipped with a water spray system. The Contractor shall roll the required streets the same day they are slurried. The Contractor will be responsible for proper scheduling of the work such that the rolling can be properly done within the given time constraint. Failure to comply shall result in a $250.00/calendar day liquidated damage being assessed per incident. The cost of furnishing the roller and operator shall be included in the price paid for slurry seal.

The Contractor is hereby advised that City streets, parking lots, or other City-approved property will not be allowed as a site for stockpiling and batching. Arrangements for an acceptable site shall be the sole responsibility of the Contractor.

The Contractor shall sweep any raveled material on the street one (1) week after the initial placement. If the Engineer determines the raveling is excessive, the frequency of sweeping shall be adjusted to the field conditions of the raveling. If raveling continues within two (2) weeks of the initial placement, the street shall be swept and reslurried with a Type I mixtures (Local Streets) or a Type II (Arterial/Collector Streets) at no cost to the City. Raveling can be identified by the presence of "black pebbles" in the gutter.

The Contractor shall remove any and all weeds that are growing through cracks from the project street located within the pavement or growing between the concrete gutter and the pavement and spray a herbicide mixture of either Hyvar mixed with Roundup or Pramatol mixed with Roundup, or approved equal, at least fourteen (14) calendar days prior to slurrying. The herbicide mixture

shall contain Blazon, or approved equal, a purple dye to easily confirm the herbicide has been applied. The work shall be approved by the Engineer or his representative prior to slurrying. Full compensation for plant removal and herbicide treatment shall be considered as included in the unit cost for slurry seal.

Longitudinal joints must correspond with lane lines. You may request other longitudinal joint patterns if they do not adversely affect the slurry seal. Spread slurry seal in full lane widths. Do not overlap slurry seal between adjacent lanes more than 3 inches. Use a material, such as building paper at transverse joints and over previously placed slurry seal to prevent double placement. Remove the material after use. Use hand tools to remove spillage.

Full compensation for developing a water supply, for furnishing and placing all water required for work done in the Contract, including extra work shall be included in the prices paid for the various items of work requiring water; and no separate payment will be made therefore. The Contractor shall supply the City with licensed weighmaster's certificates of weight for all delivered aggregates to the job during the course of each day. Aggregate shall be delivered to the project only in the presence of a City representative. The Contractor shall also present weighmaster certificates for the amount of such aggregate remaining at the completion of the project at no cost to the City. Payment shall be determined by the amount that is physically placed, which cannot exceed the amount that is delivered to the job site with the certified weighmaster tickets. There shall be not outside work done utilizing materials from the tanks or stockpiles stored for the City's Contract.

Prior to storing aggregate on private property, the Contractor shall submit to the Engineer written permission from the property owner for such stockpiling.

Precautions shall be taken to ensure that stockpiles do not become contaminated with oversized rock, clay, silt, or excessive amounts of moisture. The stockpiles shall be kept in areas that drain readily. Segregation of the aggregate will not be permitted.

The Contactor shall protect the wet slurry from traffic at all times and if damaged or defaced, the Contractor shall repair said damage at no additional cost to the City.

The placement of slurry seal may be suspended with the concurrence of the Engineer due to unsuitable weather, temperature conditions, or other conditions that are considered unfavorable for the prosecution of the work. The Contractor shall immediately comply with the order of suspension by the Engineer, and work shall not be resumed until authorized by the Engineer.

302-4.8 Spreading and Application. - *Add the following paragraphs:*
Prior to applying slurry seal, the Contractor shall clean, to the satisfaction of the Engineer, the street surface with a power sweeper, remove all R.P.M.'s, abrasive grind or sandblast completely all lane lines, street legends, crosswalks or other painted or thermoplastic surfaces. This is necessary to provide a good bonding surface for the slurry seal, as well as eliminate "ghosting" of the old striping and markings as the new slurry wears off over time.

It is anticipated that nuisance water, such as storm water runoff and irrigation water, will run in and across the right-of-way at various time throughout the period of construction. It shall be the responsibility of the Contractor, at their own expense, to provide for and protect the work from such water. In addition, the Contactor's responsibility shall include handling nuisance waters such that their operations do not cause them to damage existing improvements or properties adjacent to or near the site of work.

Slurry shall not be applied when the atmospheric temperature is less than 65°F (18°C).

The application of slurry shall not commence until after 8:00 a.m., and shall conclude at 1:30 p.m. unless other authorized by the Engineer. The slurry shall be sufficiently cured to be open to traffic by 4:00 p.m. The portions of streets to be slurried shall be closed from the time the application begins until the mixture as achieved sufficient set to be opened to traffic.

The slurry shall be applied in such a manner that no ripples or waves exist. If ripples or waves occur in the slurry during the application, the work shall cease and the Contractor shall correct the situation. The Contractor may use a drag to knock down ridges. If ripples or waves are not corrected to the Engineer's satisfaction, the street shall be reslurried at the Contractor's expense.

The Contractor shall, at the direction of the Engineer, repair the reseal to the entire street, or complete section thereof, as determined by the Engineer, which have not been sealed properly (includes areas that have failed to meet yield and mix design specifications) and completely. No compensation will be provided for slurry seal used in repair and reseal work.

Each slurry crew shall be composed, at a minimum, of a coordinator at the project site at all times, a competent quick-set mixing man, a competent driver, two squeegee men, and sufficient laborers for any handiwork and cleanup.

Surface oil and grease shall be removed or sealed with shellac or an equivalent material approved by the City before the application of the slurry seal. Full compensation for surface oil and grease removal shall be considered as included in the unit cost for slurry seal.

The Contractor shall roll all cul-de-sacs (the last 250' minimum), the last 250' of dead-end streets and knuckle curves. Full compensation for rolling the slurry shall be considered as include in the unit cost for slurry seal.

During slurry seal operations, it shall be the Contractor's responsibility to place protective covering over, or to otherwise avoid slurry seal coating of manholes, utility covers, pavement markers (reflective and non-reflective), concrete gutters, concrete cross gutters, and drainage facilities, survey monuments and remove said covering and/for slurry seal coating after slurry sealing has been completed.

The start and finish of slurry application shall be a straight line which, unless otherwise approved by the Engineer, shall be obtained by laying a strip of building paper or other material approved by the Engineer on the pavement surface. After application of slurry, the paper is to be removed leaving a straight edge. The entire street surface area shall be sealed the same day.

302-4.8.1 Crack Sealing and Filling. Crack sealing shall be performed prior to the Slurry Seal application. Pavement cracks 1/4" wide and larger shall be sealed. Pavement cracks 1/8" to 1" wide shall be cleared of all loose particles of dust, dirt and laitance with oil-free compressed air immediately preceding the sealing operation. Cracks shall be routed out as necessary to provide a reservoir for the sealer that will have a depth of l" to 1 1/2".

The crack sealing material shall be a hot-applied asphalt (Crafco Polyflex or approved equivalent). The crack sealing material must not be modified or diluted in any way. Pavement cracks larger than 1" wide shall be filled with the mixtures per Specification Section 203-6.4 Type E (Extra Fine).

A wand and nozzle type application shall be used to fill all cracks with crack sealing material. Crack sealing material shall be applied in two applications with the possibility of additional applications to fill the crack within the allowable tolerance. The cracks must be filled to the surface and not overfilled or applied to the top of adjoining pavement or concrete surfaces. The cracks shall be squeegee immediately after the sealant has been applied to insure conformity with the pavement surface.

The crack sealing material shall then be allowed to penetrate and sink into the crack area for a minimum of one hour. Each crack must then have a second application of crack sealer material applied in the crack area only to within + 0.01' of the adjoining pavement surface. If the material is a cold-applied, polymer modified petroleum emulsion, sand will be applied over the crack sealing material after the second application, covering a minimum of 1 1/2 inches each side of the crack and not more than 3/4 inch higher than the top of the pavement. The contractor shall be responsible for the removal of all excess sand which shall be removed within three hours after being applied.

302-5 ASPHALT CONCRETE PAVEMENT.

302-5.1 General. - *Add the following paragraphs:*
Asphalt concrete pavement structural sections equal to or greater than 3 inches (76 mm) in thickness shall be installed in two lifts. Base course aggregate material size shall be ¾ inch (19 mm) and cap course aggregate material size shall be ½ inch (13 mm). All pavement shall be placed over 4 inches of crushed aggregate base, unless compacted to 95% relative compaction.

All valves within project limits in the public right-of-way shall be raised to finish grade as a part of this work. The Contractor shall furnish and install new can or slip can materials as necessary. If new water valve lids are necessary, they shall be supplied by the Municipal Utilities and Engineering Department. All valve can lids within the project limits in the public right-of-way shall be painted the appropriate color for the utility they represent (ie. Water - Blue, Gas - Yellow, Fire – Red, etc.).

302-5.2 Timeline of Paving Operations.
All paving operations shall follow the timeline and requirements shown below unless otherwise approved by the City:

PAVING TIMELINE				
DESCRIPTION OF WORK	**TIME PERIOD**			
	WEEK 1 (DAY 1-7)	**WEEK 2 (DAY 8-14)**	**WEEK 3 (DAY 15-21)**	**WEEK 4 (DAY 22-28)**
PAVING (START TO FINISH) (1)				
CURE PERIOD (2)				
MANHOLE ADJUST TO GRADE (3)				
STRIPING & PAVEMENT MARKINGS (4)				
TRAFFIC LOOPS (5)				
NO PARKING SIGNS ALLOWED (6)				

Note: All time periods shown above are the maximum amount of allowable time for each activity. This timeline does not apply to the installation or repair of curb and gutter, ac dikes, sidewalks, cross gutters, curb ramps, driveway approaches or truncated domes.

(1) In no case shall any street segment remain unpaved longer than three calendar days if no other work activity is being performed on that street segment. Any deviation from the timeline shall result in a penalty assessment of $1,000 per calendar day.
(2) No work except cat tracking of proposed striping is allowed during this period; therefore "No Parking Signs" shall not be installed during this activity.
(3) Once each manhole is exposed, all associated work to adjust it to grade must be completed within 48 hours. This shall include all adjustments of manholes, vaults, valve cans, etc. as required by the Contract.
(4) All cat tracking and approval of proposed striping shall occur during the cure period.
(5) Traffic loops must be installed after the approval of striping layout and prior to the installation of thermoplastic striping and pavement markings.
(6) "No Parking Signs" shall be installed per Section 7-19 of these specifications.

302-5.4 Tack Coat. – *Delete and replace with the following:*
If the asphalt concrete pavement is being constructed directly upon an existing hard-surfaced pavement, a tack coat of High Performance Seal (HPS) No-Track Tack at an approximate rate of 0.05 gallon per square yard shall be uniformly applied upon the existing pavement preceding the placement of asphalt concrete. The surface shall be free of water, foreign material, or dust when the tack coat is applied. To minimize public inconvenience, no greater area shall be treated in any one day than is planned to be covered by asphalt concrete during the same day, unless otherwise approved by the Engineer.

302-5.5 Distribution and Spreading. – *Add the following:*
Unless otherwise permitted by the Engineer, the top layer of asphalt concrete for shoulders, tapers, transitions, road connections, private drives, curve widening, turnouts, left-turn pockets, and other such areas, shall not be spread before the top layer of asphalt concrete for the adjoining through lane has been spread and compacted. At locations where the number of lanes are changed, the top layer for the through lanes shall be paved first. Tracks or wheels of spreading equipment shall not be operated on the top layer of asphalt concrete in any area until final compaction has been completed or unless directed by the Engineer.

All screed extensions for paving machines shall be provided with a tamper, roller, or other suitable compacting devices.

Asphalt pavers shall be equipped with automatic screed controls and a sensing device or devices. Automatic grade and slope control shall be used for overlays.

All joints shall be sealed after rolling.

When placing asphalt concrete to the lines and grades noted in the plans or as approved by the Engineer, the automatic screed controls shall control the longitudinal grade and transverse slope of the screed. Grade and slope references shall be furnished, installed, and maintained by the Contractor. The Contractor shall use a ski device, the minimum length of the ski device shall be 30 ft. The ski device shall be a rigid one-piece unit and the entire length shall be utilized in activating the sensor. The Contractor may use a laser to control the screed.

When placing the initial mat of asphalt concrete on existing pavement, the end of the screed nearest the center line shall be controlled by a sensor activated by a ski device not less than 30 ft long. The end of the screed farthest from center line shall be controlled by an automatic transverse slope device set to reproduce the cross slope approved by the Engineer.

When paving contiguously with previously placed mats, the end of the screed adjacent to the previously placed mat shall be controlled by a sensor that responds to the grade of the previously placed mat and will reproduce the grade in the new mat within a 0.01 ft. tolerance. The end of the screed farthest from the previously placed mat shall be controlled in the same manner as when placing the initial mat.

Should the automatic screed controls fail to operate properly during any day's work, the Contractor may use manual control of the spreading equipment for the remainder of that day; however, the equipment shall be corrected or replaced with alternative automatically controlled equipment conforming to the requirements in this section before starting the next day's work.

Should the methods and equipment furnished by the Contractor fail to produce a layer of asphalt concrete conforming to the requirements, including straightedge tolerance, of Subsection 302-5.6.2 - Density and Smoothness, of the Standard Specifications, the paving operation shall be discontinued and the Contractor shall modify his equipment or furnish substitute equipment. A

drop-off of more than 0.15 ft will not be allowed at anytime between adjacent lanes open to public traffic.

The Contractor shall schedule his paving operations such that each layer of asphalt concrete is placed on all contiguous lanes of a traveled way each work shift. At the end of each work shift, the distance between the ends of the layers of asphalt concrete on adjacent lanes shall not be greater than 10 ft. nor less than 5 ft. Additional asphalt concrete shall be placed along the transverse edge at the end of each lane and along the exposed longitudinal edges between adjacent lanes, hand raked, and compacted to form temporary conforms. Kraft paper, or other approved bond breaker, may be placed under the conform tapers to facilitate the removal of the taper when paving operations resume.

302-5.6.1 General. - *Add the following paragraph:*
All asphalt concrete pavement abutting portland cement concrete gutters shall match and be flush with the gutter lip when finish rolling is complete.

302-5.6.2 – Density and Smoothness. *– Delete and replace with the following:*
The completed surfacing shall be thoroughly compacted, smooth and free from ruts, humps, depressions or irregularities. Any ridges, indentations or other objectionable marks left in the surface of the asphalt concrete shall be eliminated by rolling or other means. The use of any equipment that leaves humps, ridges, irregularities or other objectionable marks in the asphalt concrete shall be discontinued, and acceptable equipment shall be furnished by the Contractor.

The finished surface shall meet the following smoothness criteria:

- When a 12 foot long straightedge is laid on the finished surface parallel to the centerline of the roadway, the finished surface shall not vary from the edge of the straightedge more than 0.05 feet, except at changes in grade,
- When a 12 foot long straightedge is laid on the finished surface perpendicular to the centerline of the roadway and extends from edge to edge of a traffic lane, the finished surface shall not vary from the edge of the straightedge more than 0.05 feet, except at changes in grade.

If the top layer of pavement does not comply with the smoothness specifications shown, remove and replace the entire section or complete a grind and overlay of 1.5 inches or 3 times the aggregate size, whichever is greater. Grind and overlay will be considered as a repair method only when the thickness of the asphalt pavement section is greater than 1.5 inches following the required grinding. Corrected section shall be rectangular to the nearest pavement edge or lane line and to a crosswalk, concrete spandrel or other limits approved by the City. Do not begin corrective actions until the method and limit of correction is authorized by the City. If the tolerances cannot be achieved by the methods described above, the contractor must re-pave the street section, in kind, at their own expenses.

The compaction after rolling shall be a minimum of 91 percent and a maximum of 97 percent of the density obtained on samples compacted with the California Kneading Compactor per California Test 304. Cores will be taken randomly by the City for laboratory testing per California Test 308, Method A at a frequency of three per lot. A lot shall consist of a maximum of 3,000 square yards of asphalt concrete and will be identified in the field by the City. The cores will be

averaged to determine the percent of maximum theoretical density, as determined by ASTM D-2041, per lot to the nearest tenth of a percent.

Reduced payment factors for percent of maximum theoretical density will be per the following table, and will be applied to the entire lot sampled.

Reduced Payment Factors for Percent of Maximum Theoretical Density

Asphalt Concrete percent of maximum theoretical density	Reduced payment factor	Asphalt Concrete percent of maximum theoretical density	Reduced payment factor
91.0	0.0000	97.0	0.0000
90.9	0.0125	97.1	0.0125
90.8	0.0250	97.2	0.0250
90.7	0.0375	97.3	0.0375
90.6	0.0500	97.4	0.0500
90.5	0.0625	97.5	0.0625
90.4	0.0750	97.6	0.0750
90.3	0.0875	97.7	0.0875
90.2	0.1000	97.8	0.1000
90.1	0.1125	97.9	0.1125
90.0	0.1250	98.0	0.1250
89.9	0.1375	98.1	0.1375
89.8	0.1500	98.2	0.1500
89.7	0.1625	98.3	0.1625
89.6	0.1750	98.4	0.1750
89.5	0.1875	98.5	0.1875
89.4	0.2000	98.6	0.2000
89.3	0.2125	98.7	0.2125
89.2	0.2250	98.8	0.2250
89.1	0.2375	98.9	0.2375
89.0	0.2500	99.0	0.2500
< 89.0	Remove and replace	> 99.0	Remove and replace

In addition to the reduced payment factors below, all costs associated with the testing of the lot which resulted in values outside of the 91-97 percent range, will be withheld from the final payment due to the Contractor.

Following completion of the testing by the City, the core locations within the asphalt pavement shall be repaired by the Contractor.

302-5.6.3 Tracking. All areas receiving asphalt pavement shall be protected from tracking onto adjacent areas. Do not allow traffic on new asphalt pavement until its mid-depth temperature is below 140º Fahrenheit to minimize the tracking.

A rock dust blotter coat per Section 302-9.7 or a sand coat at a rate of 1-2 pounds per square yard shall be applied to the compacted surface for all areas where tracking is a concern. The application of tracking prevention measures shall be determined by the Contractor.

A haul route for all paving operations shall be reviewed and approved by the City prior to the start of any construction activity. No deviations from the approved haul route shall occur unless approved in writing from the City.

All tracking onto adjacent streets, striping or pavement markings shall be the responsibility of the Contractor. All striping and pavement markings shall be removed and replaced in kind by sandblasting. All tracking onto roadway surfaces may require the use of a street sweeper to the satisfaction of the City.

302-5.7 Joints. – *Add the following:*
Longitudinal joints shall be trimmed to a vertical face and to a neat line if the edges of the previously laid surfacing are, in the opinion of the Engineer, in such condition that the quality of the completed joint will be affected. Longitudinal and transverse joints shall be tested with a 12' straightedge and shall be cut back as required to conform to the provisions in Subsection 302-5.6.2 Density and Smoothness for surface smoothness. Connections to existing surfacing shall be feathered to conform to the provisions for smoothness.

Longitudinal joints in the top layer shall correspond with the edges of proposed lane striping. Longitudinal joints in all other layers shall be offset not less than 0.5' alternately each side of the edges of traffic lanes.

All feathered joints shall be sealed after rolling.

302-5.9 Measurement and Payment. – *Add the following:*
Reduced payment factors per 302-5.6.2 will be applied to the Contract Unit Price for lots with a Maximum Theoretical Density less than 91.0 and greater than 97.0 percent.

302-5.10 Hot Asphalt Leveling Course. Areas to receive the Hot Asphalt Concrete Leveling Course shall be determined and defined by the project manager and inspector, and identified to the Contractor in the field. Mix for hot Asphalt Concrete Leveling Course shall be 1/2 inch aggregate, C2, as defined in Section 203-6.4.3.

Areas to receive hot asphalt concrete leveling course shall be areas located near or adjacent to existing curbs and/or gutters that are potholed, or have the lip of gutter higher than the adjacent roadway. Potholes, large cracks, or ruts shall be filled to the surrounding grade elevation and compacted. Hot Asphalt Concrete Leveling Course shall be completed prior to the placement of Type II Slurry Seal, ARAM or resurfacing.

Prior to placement of asphalt concrete, the surface shall be cleaned and all debris and deleterious materials shall be removed. A tack coat meeting the material and application requirements of Section 302-5.4 Tack Coat, shall be applied prior to placement of hot mix asphalt concrete.

302-5.11 Asphalt Pavement Crack Sealing and Filling. Crack sealing shall only be performed as a repair method for conventional hot mix asphalt pavement (HMA) and not installed at project locations which will have asphalt rubber hot mix (ARHM) used as the overlay material. Crack

sealing shall be performed after milling of existing asphalt surface and prior to any leveling course, if necessary.

Right after milling of existing asphalt and before crack sealing or filling, Contractor shall remove any and all weeds that are growing through cracks from the project street located within the pavement or growing between the concrete gutter and the pavement and spray a herbicide mixture of either Hyvar mixed with Roundup or Pramatol mixed with Roundup, or approved equal, at least seven (7) calendar days prior to paving. The herbicide mixture shall contain Blazon, or approved equal, a purple dye to easily confirm the herbicide has been applied. The work shall be approved by the Engineer or his representative prior to paving. Full compensation for plant removal and herbicide treatment shall be considered as included in the unit cost for paving.

The crack sealing material shall be a hot-applied asphalt (Crafco Polyflex or approved equivalent). The crack sealing material must not be modified or diluted in any way. Pavement cracks larger than 1" wide shall be filled with the mixtures per Specification Section 203-6.4 Type E (Extra Fine).

A wand and nozzle type application shall be used to fill all cracks with crack sealing material. Crack sealing material shall be applied in two applications with the possibility of additional applications to fill the crack within the allowable tolerance. The cracks must be filled to the surface and not overfilled or applied to the top of adjoining pavement or concrete surfaces. The cracks shall be squeegee immediately after the sealant has been applied to insure conformity with the pavement surface.

The crack sealing material shall then be allowed to penetrate and sink into the crack area for a minimum of one hour. Each crack must then have a second application of crack sealer material applied in the crack area only to within + 0.01' of the adjoining pavement surface. If the material is a cold-applied, polymer modified petroleum emulsion, sand will be applied over the crack sealing material after the second application, covering a minimum of 1 1/2 inches each side of the crack and not more than 3/4 inch higher than the top of the pavement. The contractor shall be responsible for the removal of all excess sand which shall be removed within three hours after being applied.

SECTION 303 - CONCRETE AND MASONRY CONSTRUCTION

303-1 CONCRETE STRUCTURES.

303-1.1 General. - *Delete the first sentence of paragraph 1 and replace with the following:*
"Concrete bridges, culverts, catch basins, retaining walls, abutments, piers, footings, foundations, drainage inlets, head walls, end walls, wing walls, junction structures, transition structures, manholes, and other similar types of portland cement concrete structures shall be constructed to the lines and grades in conformity with the Plans and Specifications.

303-5 CONCRETE CURBS, WALKS, GUTTERS, CROSS GUTTERS, ALLEY INTERSECTIONS, ACCESS RAMPS, AND DRIVEWAYS.

303-5.1.1 General. - *Replace the last paragraph with the following:*

No PCC shall be ordered and/or placed until the forms and subgrade have been inspected and approved by the Engineer in the field.

All pull boxes, water meter boxes, and water valve covers shall be adjusted to proposed finish grade and approved by the Engineer in the field prior to placement of the PCC.

The Contractor shall barricade and protect placed PCC from all damage, marks, mars, and/or graffiti. Any PCC damaged, defaced, discolored, or defective shall be replaced at the Contractor's expense.

When removals of curb and/or sidewalk are located at curb return, the Contractor shall install access ramps. The Contractor is to construct all access ramps in accordance with American Disability Act (ADA) Standards/California Code of Regulations Title 24 – Accessibility Regulations. If the ramps constructed by the Contractor are found to be in non-compliance with ADA Standards, the Contractor will be required to remove and replace the ramps to ADA Standards at the Contractor's expense.

303-5.1.2 Drainage Outlets Through Curb. - *Add the following paragraph*:
Coring shall be required for all drains through existing curbs.

303-5.1.3 Driveway Entrances. – *Replace the last paragraph with the following:*
Driveway approaches where required, shall be 150 mm (6") thick for single-family residential area, and 200 mm (8") thick for commercial driveway approaches.

303-5.1.4 Walk. The back of sidewalk shall be 2 inches from the street Right-of-Way line unless otherwise specified by the Engineer.

Included in the price of sidewalk construction are retaining curbs. Retaining curbs are needed to retain soils from sloughing and eroding onto the finished sidewalk surface, as a result of grade differentials from existing ground surface to proposed sidewalk surface. Retaining curbs shall be installed when the finished surface is lower than the surrounding grade by 3 inches vertically within 6 inches horizontally. If the vertical difference in elevation is less than 3 inches, the surrounding grade shall be sloped, maximum 2:1 slope, to match the finished elevation. The height of the retaining curb shall be to the height of the existing grade it is retaining. Retaining curbs shall be located within the City's right-of-way at all times.

303-5.1.5 Access Ramps. Construction of curb ramps shall conform to the Type and Case appropriate for the condition, as specified on the plans and as shown within the 2012 Standard Plans for Public Works Construction, Plan 111-5. The Contractor shall be responsible to layout the proposed access ramp to comply with the maximum slope indicated on the plans or Standard Plan 111-5. The maximum slope for the ramp shall not be exceeded unless otherwise approved in writing by the Engineer. The Contractor shall remove and replace access ramps deemed non-compliant with the plans or Standard Plan 111-5.

For proposed locations adjacent to a cross gutter spandrel, sawcuts along the radius of the curb will not be allowed. The spandrel shall be replaced from expansion joint to expansion joint to the extents of the curb removal. For proposed locations adjacent to curb and gutter, sawcuts along the flowline of the curb will not be allowed. The entire curb and gutter shall be replaced from expansion joint to expansion joint as required. Sawcuts at locations other than the expansion joint

will not be allowed unless approved by the Engineer. Curb cuts of the existing curb will not be permitted for installation of proposed ramp. Any deviation from these requirements will result in rejection of all work at this location and shall not be included in progress payment requests until corrected, per direction from the Engineer.

The Contractor shall verify the extents of sawcut and removal for each access ramp taking into account the maximum slope and transition area required. It shall be the Contractor's responsibility to identify required removal limits, set concrete forms and verify maximum slopes are not exceeded. The Engineer shall be present to verify the concrete forms prior to the placement of the concrete at each location, however this does not alleviate the responsibility of the accuracy of forms or slopes of the access ramp from the Contractor.

Included in the price of access ramps are retaining curbs. Retaining curbs are needed to retain soils from sloughing and eroding onto the finished ramp surface, as a result of grade differentials from existing ground surface to proposed ramp surface. Retaining curbs shall be installed when the finished surface is lower than the surrounding grade by 3 inches vertically within 6 inches horizontally. If the vertical difference in elevation is less than 3 inches, the surrounding grade shall be sloped, maximum 2:1 slope, to match the finished elevation. The height of the retaining curb shall be to the height of the existing grade it is retaining. Retaining curbs shall be located within the City's right-of-way at all times.

Access Ramps shall have truncated domes installed in accordance with standard plans and specifications. Truncated domes on new access ramps shall be Armor-Tile, Cast in Place System, Equal Tile, or approved equal. Truncated domes installed on existing surfaces shall be Safety Sted TD, or approved equal. Truncated dome panels shall be 36"x48", inline configuration, with a spacing of 2.35" on center, and Federal Yellow in color.

The access ramp work shall include all related adjustments of pull boxes, pull box covers, signs, and protection of any underground utilities within the work area. The removal and replacement of up to 5 linear feet of sidewalk on each side of the access ramp shall be included within the cost of the access ramp. The removal and replacement of the sidewalk will allow for transition from the top of ramp to adjacent sidewalk and will be utilized as necessary.

303-5.4.3 Weakened Plane Joints, (a) General. - *Add the following paragraph:*
All weakened plane joints shall be spaced at a maximum of 3.05 m (10') feet for curbs, gutters, and sidewalks. Scoring lines shall conform to those prevailing in the area and be uniform in spacing.

303-5.5.2 Curb. - *Replace the first paragraph with the following:*
PCC for curb and gutter shall be placed within three working days from removal of the existing PCC curb and gutter. The curb and gutter surface shall not vary more than 3 mm (0.01') from a 3 m (10') straightedge except at the grade changes. Prior to the removal of the forms, the surface shall be finished true to grade by means of a straightedge float of not less than 3 m (10') in length, and operated longitudinally over the surface of the concrete. Form clamps shall be constructed so as not to interfere with the operation of the float. The form on the front of the curbs shall not be removed less than one (1) hour, nor more than six (6) hours after the concrete has been placed. In no event shall forms be removed while the concrete is sufficiently plastic to slump. The top and

face of the finished curb shall be true and straight, and top surface of curbs shall be of uniform width, free from humps, sags, blemishes, or other irregularities.

303-5.5.3 Walk. - *Add the following paragraphs:*
The sidewalk surface shall not vary more than 5 mm (0.02') from the 3m (10') straightedge except at grade changes, and the finished surface shall be free from humps, sags, blemishes or other irregularities. All sidewalks shall be a minimum of 100 mm (4") thick, except at driveways where the sidewalks shall be a minimum of 150 mm (6") thick for single family residential areas and 200 mm (8") thick for all other areas.

303-5.6 Curing. - *Add the following paragraph:*
Curing compound shall be translucent with red fugitive dye, Type 1, in accordance with Section 201-4 Concrete Curing Compound, of the Standard Specifications.

303-5.7 Repairs and Replacements. - *Add the following paragraphs:*
In order to minimize vandalism damage to the finished PCC surfaces, the Contractor shall plan his work so that no PCC is poured after 1:00 p.m., unless otherwise authorized by the Engineer in the field.

The Contractor shall barricade and protect placed Portland Cement Concrete from all damages, marks, mars, and/or graffiti. Any Portland Cement Concrete damaged, defaced, discolored, or defective shall be replaced to the satisfaction of the Engineer at the Contractor's expense, and no additional time will be allowed.

Grading, patching, or other remedies to correct the situation will not be accepted unless in the opinion of the Engineer the vandalized area is so small that it does not warrant replacement. Concrete replacement areas shall be from score mark or control joint to score mark or control joint, and full width of the sidewalk. All replacement areas shall be saw cut.

303-5.8 Backfilling and Cleanup. - *Add the following paragraph:*
A minimum of 300mm (12”) wide full depth asphalt concrete pavement repair patch and an 450mm (18”) wide 1-1/2” deep grind outside of the trench width is required when cross gutter, spandrel, driveways, curb and gutter is placed adjacent to existing asphalt concrete pavement. The asphalt concrete pavement repair patch shall be placed within two (2) working days after the cross gutters, spandrels, driveways, curb and gutter are replaced. The asphalt concrete pavement shall be sawcut. All work shall be in accordance with the General Permit Conditions and Trench Specifications, latest edition.

SECTION 304 - METAL FABRICATION AND CONSTRUCTION

304-3 CHAIN LINK FENCE.

304-3.4 Measurement and Payment. - *Delete paragraph 1 and replace with:*
Chain link fence will be measured along the horizontal projection line of the completed fence, deducting the widths of gates and openings.

SECTION 314 - TRAFFIC STRIPING, CURB AND PAVEMENT MARKINGS, AND PAVEMENT MARKERS

314-1 GENERAL. - *Add the following paragraphs:*
To insure the protection of storm drain inlets, Best Management Practices (BMPs) shall be employed during all striping operations. Refer to Section 7-8.6.

Each storm drain catch basin or storm drain inlet box shall be marked "NO DUMPING - FLOWS TO CREEK." Two coats of paint are required. Stencil shall match City's stencil. Paint and painting shall comply with the specifications.

All street resurfacing work shall include installing fire hydrant pavement markers at all fire hydrant location, whether the pavement markers were existing or not. The pavement markers shall be Type I – Two-Way Blue Retroreflective per Section 214-6 of the Specifications and installed per City's detail drawing No. 102-0. All work associated with the installation of all new, or replacement of existing, fire hydrant pavement markers shall be included as noted within the specifications.

314-4 APPLICATION OF TRAFFIC STRIPING AND CURB AND PAVEMENT MARKINGS.

314-4.1 General. – *Add the following paragraphs:*
During construction, if traffic legends or lane striping are removed or paved-over for any reason, they shall be replaced immediately with temporary traffic legends or lane striping as directed by the City, and the Contractor shall place permanent traffic legends or lane striping at the end of the job or on completion of final paving. When permanent items are placed, they shall be complete markings, legends, or striping i.e.: if limit lines are disturbed, they shall be replaced to centerline or from curb to curb, whichever was existing; if a letter in a word is removed or covered, the entire word shall be replaced; and lane striping shall extend 75 feet beyond construction limits. All replacement markings, legends, or striping required to be replaced beyond the contract limits shown shall be at the cost of the Contractor and shall meet City standards. If existing striping or legends are to be removed on existing surfaces, they shall be sandblasted. Painting over striping or legends in lieu of removal will not be permitted. Pavement striping shall comply with the applicable provisions of Sections 214 and 314 of the Standard Specifications.

Where side streets with existing striping, markings and markers are encountered, striping, markings and markers shall be repainted and replaced for a minimum distance of 15 m (50 feet) from the crosswalk, stop bar or limit line.

314-4.2 Control of Alignment and Layout.

314-4.2.1 General. - Delete and replace with t*he following:*
The Contractor will be responsible for all layout of all striping. All striping, markings and markers shall be reinstalled in their existing locations unless otherwise shown on the plans. The Contractor shall be responsible to take appropriate measures and record the existing locations.

The Contractor shall verify all dimensions in the field prior to installation of pavement striping/marking layout (Cat-Track). Should field measurements differ from the plan, the Contractor shall immediately notify City staff. No Cat-Track marks shall be placed until discrepancies are resolved.

Cat-Track must be approved by City staff prior to the installation of permanent pavement striping/marking. Contractor shall notify City staff a minimum of 24 hours prior to installation of permanent pavement striping/marking to allow for inspection and approval. If approval of Cat-Track is not obtained by the Contractor, all work required to correct the striping/marking will be at the expense of the Contractor

Cat-Track marks shall be made in chalk. Paint for the purpose of Cat-Track is prohibited. If paint is used, the Contractor must remove the paint without damaging or visually deforming the pavement surface. If damage or visual deformity within the removal area occurs, in the opinion of City staff, the Contractor shall grind and overlay the entire segment with no additional compensation. The area of the grind and overlay shall be as required by City staff and shall be a minimum of 0.10' thickness.

All visible Cat-Track markings after the installation of the permanent striping/marking shall be removed without damage or visual deformity to the pavement surface. Any damage or visual deformity to the pavement shall be remedied as noted above.

314-4.3.5 Application. - *Amend the first sentence in paragraph 8 as follows:*
"Glass beads shall be applied at a rate of 0.6 to 0.8 kg of beads per liter (5 to 7 pounds of beads per gallon)."

314-6 GREEN BIKE LANE. Green bike lanes shall be installed per plan and conform to the technical specifications included within the contract documents and shall be Streetbond CL or approved equal.

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GENERAL REQUIREMENTS

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SECTION 01110 COORDINATION OF WORK

PART ONE – GENERAL

1.1 SEQUENCING OF WORK

The Contractor shall submit the construction schedule in accordance with Section 01321 of these specifications.

The Contractor shall arrange the schedule of work, but it must adhere to the following restrictions:

1. Contractor shall schedule full work days of operation.
2. Citywide events calendar shall be considered with the schedule for construction.
3. The events calendar will be provided at the pre-construction meeting. Updated events calendar will be provided during subsequent weekly construction meetings.
4. Detailed construction activities and construction schedule will be provided during weekly construction meetings.

1.2 UTILITY COORDINATION

During construction, if City owned utility facilities are damaged, contractor shall inform the City. City crew will respond within two hours and assess the condition, and perform any necessary remedial work as quickly as possible. No additional compensation will be granted to the contractor for any delay due to the damage and repair of the utility facility. Other utilities not owned by the City, contractor should notify and coordinate with the utility owner.

END OF SECTION

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SECTION 01112 DESCRIPTION OF WORK

PART ONE -- GENERAL

1.1 SUMMARY

A. The work to be done under this Contract includes the furnishing of project management, labor, materials, tools and equipment for the construction of the Wastewater Treatment Plant Slope Stabilization and Stairway Improvements Project, Project No. 521038 for the City of Redlands, all in accordance with the Contract Documents.

B. The following contract drawings are made a part of these Contract Documents:

Title	Sheet No.
Title Sheet & Vicinity Map	1
Precise Grading	2
Detail Sheet	3
Irrigation Plan	4
Irrigation Details	5
Planting Plan	6
Irrigation Specifications	7
Planting Specifications	8

1.2 GENERAL SCOPE OF WORK

A. Work In This Contract: Work in this Contract includes all labor, materials and equipment necessary for construction of Wastewater Treatment Plant Slope Stabilization and Stairway Improvements Project, Project No. 521038 as noted on the Contract Drawings and all other Contract Documents and is summarized as follows:

1. The Work shall consist of furnishing and constructing retaining walls, v-ditch, v-drains, u-ditch, grate inlets, concrete block slough wall, reinforced concrete stairway, installing type A, and appurtenances; all traffic control (including furnishing and installing all arrowboards, barricades, signs, delineators, and flagmen); all utility location and verification (excavating, exposing, and verifying top, bottom, and side of utility facilities); all pavement removal and disposal; all earthwork (including trenching, shoring, sloping, bedding, and backfilling including select imported material or select native material); compacting; protecting in place or removing and replacing all existing utilities, trees, and

public and private improvements; replacing all asphalt concrete pavement including asphalt concrete overlays; pavement striping and restriping; testing and disinfecting all pipelines; replacing destroyed survey monuments; disposing of excess soil and rock material and restoring all areas and improvements to pre-construction conditions.

2. The Contractor shall, upon completion of the pipeline construction and appurtenances required herein, initially operate all components of the Contract Work furnished and installed by Contractor, and make any additional adjustments, corrections, repairs, replacements, and reconstructions necessary to provide the City with complete, correctly operating pipeline and appurtenances.

END OF SECTION

SECTION 01200_REV1 MEASUREMENT AND PAYMENT

A. Work Listed in the Schedule of Work Items

1. The application for payment will be for a specific item based on the percentage completed or quantity installed. The percentage complete will be based on the value of the partially completed work relative to the value of the item when entirely completed and ready for service.

2. A retention of five percent (5%) of the value of work completed will be withheld from progress payments. This retention amount will remain constant throughout the contract period, and will not be payable until the expiration of thirty-five (35) days after the recordation of the Notice of Completion.

B. Work Not Listed in the Schedule of Work Items

The General Conditions and items in the General Requirements, and Specifications which are not listed in the schedule of work items of the bid form are, in general, applicable to more than one listed work item, and no separate work item is provided therefore. Include the cost of work not listed but necessary to complete the project designated in the contract documents in the various listed work items of the bid form.

The bids for the work are intended to establish a total cost for the work in its entirety. Should the Contractor feel that the cost for the work has not been established by specific items in the bid form, include the cost for that work in some related bid item so that the proposal for the project reflects the total cost for completing the work in its entirety.

The Contractor may experience difficulty in excavation due to rock or unsuitable backfill material throughout the project locations. It shall be the Contractor's responsibility to identify these areas and account for difficulty in excavation, the need to export rock or unsuitable backfill material and the need to import suitable backfill material. There will not be additional contract time or additional compensation for any project locations where any of these circumstances occur.

C. Bid Items

1. Mobilization, Bid Item 1:

Payment for Mobilization shall be made at the contract lump sum price and shall constitute full compensation for all labor, material, equipment, and incidentals required within Section 01721. The bid price shall include, but not limited to, preliminary construction schedule, bonds, insurance, installation and relocation of information signs, shop drawings, catalog submittals and shall constitute full compensation for all labor,

material, equipment and incidentals required. The bid price for mobilization shall not exceed 5 percent of the Bid Schedule total price.

2. SWPPP – Bid Item 2:

Payment for Storm Water Pollution Prevention Plan (SWPPP) shall be made at the contract lump sum price and shall constitute full compensation for preparation, approval, NPDES Permit and shall include all labor and incidentals noted within Section 01571.

Payment for the SWPPP shall be made based on the percentage of project completion to ensure compliance with all requirements. The completeness shall be determined by the Engineer and updated on progress payments.

3. Construction Staking, Bid Item 3:

Payment for Construction Staking shall be made at the contract lump sum price and shall constitute full compensation for all labor, material, equipment and incidentals required. No partial payment will be released. All must be complete and operable before any compensation will be released.

4. Retaining Wall, Bid Item 4:

This item includes construction/installation of retaining walls per Plans and Specifications, and/or per details shown on the Plans as well as per Standards.

Payment for Retaining Wall shall be made at the contract unit price and shall constitute full compensation for all labor, material, equipment and incidentals required. No partial payment will be released. All must be complete and operable before any compensation will be released.

5. Concrete Block Slough Wall, Bid Item 5:

This item includes construction/installation of concrete block slough wall per Plans and Specifications, and/or per details shown on the Plans as well as per Standards.

Payment for Concrete Block Slough Wall shall be made at the contract unit price and shall constitute full compensation for all labor, material, equipment and incidentals required. No partial payment will be released. All must be complete and operable before any compensation will be released.

6. Reinforced Concrete Stairway, Bid Item 6:

This item includes construction/installation of reinforced concrete stairway per Plans and Specifications, and/or per details shown on the Plans as well as per Standards.

Payment for Reinforced Concrete Stairway shall be made at the contract unit price and shall constitute full compensation for all labor, material, equipment and incidentals required. No partial payment will be released. All must be complete and operable before any compensation will be released.

7. Metal Hand Railings, Bid Item 7:

This item includes construction/installation of metal hand railings per Plans and Specifications, and/or per details shown on the Plans as well as per Standards.

Payment for Metal Hand Railings shall be made at the contract unit price and shall constitute full compensation for all labor, material, equipment and incidentals required. No partial payment will be released. All must be complete and operable before any compensation will be released.

8. V-Ditch, Bid Item 8:

This item includes construction/installation of v-ditch per Plans and Specifications, and/or per details shown on the Plans as well as per Standards.

Payment for V-Ditch shall be made at the contract unit price and shall constitute full compensation for all labor, material, equipment and incidentals required. No partial payment will be released. All must be complete and operable before any compensation will be released.

9. U-Channel, Bid Item 9:

This item includes construction/installation of u-channel per Plans and Specifications, and/or per details shown on the Plans as well as per Standards.

Payment for U-Channel shall be made at the contract unit price and shall constitute full compensation for all labor, material, equipment and incidentals required. No partial payment will be released. All must be complete and operable before any compensation will be released.

10. Grate Inlets, Bid Item 10:

This item includes construction/installation of grate inlets per Plans and Specifications, and/or per details shown on the Plans as well as per Standards.

Payment for Grate Inlets shall be made at the contract unit price and shall constitute full compensation for all labor, material, equipment and incidentals required. No partial payment will be released. All must be complete and operable before any compensation will be released.

11. Stairway Lights (Solar), Bid Item 11:

This item includes construction/installation of stairway lights (solar) per Plans and Specifications, and/or per details shown on the Plans as well as per Standards.

Payment for Stairway Lights (Solar) shall be made at the contract unit price and shall constitute full compensation for all labor, material, equipment and incidentals required. No partial payment will be released. All must be complete and operable before any compensation will be released.

12. Landscape & Irrigation, Bid Item 12:

This item includes construction/installation of landscape & irrigation per Plans and Specifications, and/or per details shown on the Plans as well as per Standards.

Payment for Landscape & Irrigation shall be made at the contract unit price and shall constitute full compensation for all labor, material, equipment and incidentals required. No partial payment will be released. All must be complete and operable before any compensation will be released.

13. Construct 4" Thick Concrete Slab w/ #3 Bars at 24" O.C.E.W. & #3 Cont. Bar at Edge, Bid Item 13:

This item includes construction/installation of 4" thick concrete slab w/ #3 bars at 24" O.C.E.W. cont. bar at edge per Plans and Specifications, and/or per details shown on the Plans as well as per Standards.

Payment for Construction of 4" Thick Concrete Slab w/ #3 Bars at 24" O.C.E.W. & #3 Cont. Bar at Edge shall be made at the contract unit price and shall constitute full compensation for all labor, material, equipment and incidentals required. No partial payment will be released. All must be complete and operable before any compensation will be released.

14. Construct V-Drain Per Detail, Bid Item 14:

This item includes construction/installation of v-drain per Plans and Specifications, and/or per details shown on the Plans as well as per Standards.

Payment for Construction of V-Drain shall be made at the contract unit price and shall constitute full compensation for all labor, material, equipment and incidentals required. No partial payment will be released. All must be complete and operable before any compensation will be released.

15. Remove and Dispose of Existing V-Drain, Bid Item 15:

This item includes removal and disposal of existing v-drain per Plans and Specifications, and/or per details shown on the Plans as well as per Standards.

Payment for Removal and Disposal of Existing V-Drain shall be made at the contract unit price and shall constitute full compensation for all labor, material, equipment and incidentals required. No partial payment will be released. All must be complete and operable before any compensation will be released.

16. Construct Retaining Wall Utility Opening Per SPPWC STD. 617-3, Bid Item 16:

This item includes construction/installation of retaining wall utility opening per Plans and Specifications, and/or per details shown on the Plans as well as per Standards.

Payment for Construction of Retaining Wall Utility Opening Per SPPWC STD. 617-3 shall be made at the contract unit price and shall constitute full compensation for all labor, material, equipment and incidentals required. No partial payment will be released. All must be complete and operable before any compensation will be released.

17. Earthwork and/or Export Material, Bid Item 17:

Payment for the earthwork work shall be made at the contract unit price and shall constitute full compensation for all labor, materials, equipment, and incidentals required. The earthwork for the slope stabilization project involved careful excavation and grading of soil to reestablish stable ground conditions and prepare the area for structural improvements. Excavation activities were performed in controlled sections to remove unsuitable or unstable materials while minimizing disturbance to surrounding areas. The cut material was stockpiled and either reused as engineered fill or hauled offsite at the contractor's expense, depending on suitability. Final grading ensured proper slope geometry and surface drainage, providing a stable foundation for the installation of stabilization measures such as retaining structures, soil nails, or erosion control systems.

18. Unforeseen Work <u>not</u> Covered within all other bid items, Bid Item 18:

Payment for the unforeseen work not covered within all other bid items shall be made at the contract price per lump sum (LS) and shall constitute full compensation for all labor, materials, equipment, and incidentals required. Unforeseen work must be approved by the City staff before doing any work and pay estimate shall be negotiated based on unit price already established with the bid proposal for this project. Any required work that is outside of the proposed bid unit cost, shall be performed based on the Time and Material (T&M) basis and T&M cost shall be negotiated and approved by the City staff prior to performing the work. Unforeseen work will be paid in each billing cycle with a percentage of the lump sum cost included in the bid. This item may not be spent entirely.

19. Demobilization, Bid Item 19:

Payment for Demobilization shall be made at the contract lump sum price and shall constitute full compensation for all labor, material, equipment, and incidentals required within Section 01740.

END OF SECTION

THE CITY OF REDLANDS
MUNICIPAL UTILITIES AND ENGINEERING DEPARTMENT

CHANGE ORDER REQUEST (COR)

Project Name:		**COR Number:**	
Project Number:		**Date of Request:**	
Requested By:			

Change Name:	

Description of Change (Required):

Reason for Change (Required):

Location of Change (Required): List all locations if various locations are included in this Request

Additional Days Requested Due to Change (If Applicable):

Total Net Change in Cost: **Note:** Attach all supporting documents for cost justification	$ 0.00

Requestor:

Signature: _____

Title: _____ **Date:** _____

Change Order Cost Summary

Project Name :

Change Order Request No. :

Date :

		Direct Labor	Direct Materials	Direct Equipment		Totals
(1):	Lump Sum Work by Prime Contractor	$0.00	$0.00	$0.00		
(2):	"T&M" Work by Prime Contractor	$0.00	$0.00	$0.00		
(3):	Subtotal - Direct Work (Prime Contractor)	$0.00	$0.00	$0.00		
(4):	All Lump Sum Work by subcontractors (any tier)	$0.00	$0.00	$0.00		
(5):	All "T&M" Work by subcontractors (any tier)	$0.00	$0.00	$0.00		
(6):	Subtotal - Direct Work (all subcontractors)	$0.00	$0.00	$0.00		$0.00
					Add each of the three columns across and enter to the right.	
(3)+(6)=(7):	Total - Direct Costs	$0.00	$0.00	$0.00		$0.00
(8):	Markup	(20% of direct labor) $0.00	(15% of direct mat'l) $0.00	(15% of direct equip) $0.00		$0.00
(9):	Prime Contractor Markup for subcontractors				10% of line (6) direct sub work up to $5,000 plus 5% of line (6) direct sub work over $5,000	
(10):	Bonds & Insurance				1% of line (7) all direct work	$0.00
(11):	Additional amount permitted by Contract					
(12):	**GRAND TOTAL**				Add sums of lines) (7), (8), (9), (10) and (11)	**$0.00**

SECTION 01298 SCHEDULE OF VALUES

1.1 GENERAL

A. The Schedule of Values shall be used as a basis for determining progress payments on a lump sum contract or any designated lump sum bid item. The Schedule of Values shall be a schedule of cost loaded construction activities equal, in total, to the lump sum bid and shall be in such form and sufficient detail to correctly represent a reasonable apportionment of the lump sum. Prior to submitting an invoice for payment, the CONTRACTOR shall have submitted a detailed Schedule of Values and obtained approval from the ENGINEER.

B. Each lump sum bid item on the Schedule of Work and Prices, as set forth in the Bid must be broken down separately. The breakdown of each lump sum bid item must cover the cost of construction required by the contract documents for that item. The sum of the values for the construction activities, within a bid item, must equal the total bid amount for that item. The breakdown shall include subcontract amounts which shall not deviate from the amounts submitted in the Bid Proposal. The CONTRACTOR shall provide certification from the Subcontractors certifying the subcontract amounts.

C. Each activity in the Schedule of Values shall delineate one construction activity. For example, the placement of concrete between construction joints, the construction of an electrical duct bank or pipeline between points A & B. The costing for each activity should include all costs for the labor and materials or equipment required to complete the activity. For example, concrete construction activities should include all costs for the forming, placing of reinforcement, placing concrete and curing. The cost for pipeline construction activities should include materials, equipment and installation including pipeline supports or thrust blocks. The excavation and backfill for a pipeline or structure may be separate activities. The Contract Price breakdown shall include the itemized costs for the plant establishment and any maintenance services to be performed before the final project acceptance is made. No non-construction activity shall be cost loaded.

D. The CONTRACTOR shall use cost loaded construction activities from the Construction Schedule as a Schedule of Values. Each construction activity shall be encoded to its bid item and a sort provided for each bid item totaling the cost loaded amount. The total of the Cost Loaded amounts for each bid item shall equal the amount bid for that item. The total of the Schedule of Values shall equal the current Contract value at all times. At any time during the progress of the Work of the Contract the INSPECTOR reserves the right to review the cost loading of the Schedules of Values and direct necessary revisions. When requested by the INSPECTOR, the CONTRACTOR shall provide all information necessary to substantiate the cost loading.

E. Attached are samples of the Schedule of Values. The City will provide project specific Schedule of Values for the CONTRACTOR to use throughout the project at the Preconstruction Meeting. The Schedule of Values must be used by the CONTRATRACTOR at the time of each progress payment.

END OF SECTION

SCHEDULE OF VALUES

Project Name

Contractor Name
Address
Address
Phone:

PROJECT NUMBER:

FOR BILLING PERIOD ENDING:
INVOICE DATE:
INVOICE NO.

	BID ITEM/DESCRIPTION OF WORK FOR BID ITEM	QUANT.	UNIT	UNIT BID PRICE	ITEM BID PRICE	WORK PREVIOUSLY COMPLETED		WORK COMPLETED THIS MONTH		TOTAL QTY TO DATE	VALUE OF WORK COMPL TO DATE
						QTY	$ VALUE	QTY	$VALUE		
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00

Project Name

Contractor Name
Address
Address
Phone:

PROJECT NUMBER:

FOR BILLING PERIOD ENDING:
INVOICE DATE:
INVOICE NO.

	BID ITEM/DESCRIPTION OF WORK FOR BID ITEM	QUANT.	UNIT	UNIT BID PRICE	ITEM BID PRICE	WORK PREVIOUSLY COMPLETED		WORK COMPLETED THIS MONTH		TOTAL QTY TO DATE	VALUE OF WORK COMPL TO DATE
						QTY	$ VALUE	QTY	$VALUE		
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00			0.0	$0.00
	TOTALS				$0.00		$0.00		$0.00		$0.00

SUMMARY OF CHANGE ORDERS	QTY	UNIT	UNIT BID PRICE	QTY	$ VALUE	QTY	$ VALUE	TOTAL QTY TO DATE	VALUE OF WORK COMPL TO DATE
CHANGE ORDER NO. 1	1	LS						0.0	$0.00
CHANGE ORDER NO. 2	1	LS						0.0	$0.00
CHANGE ORDER NO. 3	1	LS						0.0	$0.00
CHANGE ORDER NO. 4	1	LS						0.0	$0.00
CHANGE ORDER NO. 5	1	LS						0.0	$0.00
CHANGE ORDER NO. 6	1	LS						0.0	$0.00
CHANGE ORDER NO. 7	1	LS						0.0	$0.00
CHANGE ORDER NO. 8	1	LS						0.0	$0.00
CHANGE ORDER NO. 9	1	LS						0.0	$0.00
CHANGE ORDER NO. 10	1	LS						0.0	$0.00
								0.0	$0.00
								0.0	$0.00
								0.0	$0.00
								0.0	$0.00
								0.0	$0.00
CHANGE ORDERS TOTAL			$0.00				$0.00		$0.00

			VALUE OF WORK COMPLETED TO DATE	$0.00
ORIGINAL CONTRACT PRICE	$0.00		AMOUNT DUE THIS PERIOD INCL RETENTION	$0.00
TOTAL AMOUNT OF CHANGE ORDERS	$0.00		LESS 5% RETENTION	$0.00
ESTIMATED TOTAL CONTRACT PRICE TO DATE	$0.00		**AMOUNT DUE THIS PERIOD**	**$0.00**

SECTION 01321 CONSTRUCTION SCHEDULE

1. THE REQUIREMENT

A. It is expressly understood and agreed that the time of beginning, the rate of progress, and the time of completion of the Work are of the essence of this Contract.

B. The CONTRACTOR'S representative in charge of scheduling is required to attend all meetings pertaining to scheduling and progress of the Work.

C. The CONTRACTOR shall submit to the ENGINEER 3 hard copies and the electronic file of the CONTRACTOR'S Construction Schedule (the schedule) at the time of the preconstruction meeting. The schedule shall be either a Critical Path Method (CPM) Network or a detailed Bar Chart with the critical path clearly shown. If the CPM network option is used, then Primavera Project Management or Microsoft Project shall be the scheduling software. If a detail Bar Chart is used, Microsoft Excel shall be the software utilized. The schedule shall include the following:

1. Activity ID,
2. Activity Description,
3. Start date for each activity,
4. Finish date for each activity,
5. Original duration,
6. Predecessor,
7. Successor,
8. Percent Complete,
9. Remaining Days.

A minimum of seven (7) calendar days for review of each schedule. Schedule activities shall be of sufficient detail to assure adequate planning has been done for proper execution of the Work and such that, in the sole judgement of the ENGINEER, it provides an appropriate basis for monitoring progress. The schedule shall begin with the date of issuance of the Notice to Proceed and conclude with the date of Final Completion shown in the Contract. Submittal and approval of the schedule in accordance with the requirements of this Section is a condition precedent to the issuance of any payments under this Contract. Once the schedule is approved it will become the baseline schedule and must be shown and compared on all subsequent schedule submittals.

D. Float, slack time, or contingency within the schedule (i.e., the difference in time between the project's early completion date and the required Contract Completion date), and total float within the schedule, is not for the exclusive use of either the CITY or the CONTRACTOR, but is a jointly owned expiring resource available to and shared by both parties. Pursuant to this float sharing requirement, use of

float suppression techniques shall be cause for rejection of the schedule and any revisions or updates.

E. Time extensions shall not be granted nor delay damages paid until a delay occurs which is beyond the control and without the fault or negligence of the CONTRACTOR and its Subcontractors or Suppliers, at any tier, and which extends actual performance of the Work beyond the current Contract completion date and the completion date projected by the current, approved, updated schedule. If the delay occurs along a path, which the current approved Construction Schedule update projects late completion prior to addition of any CITY caused delay, then the time extension allowed will be only for the additional delay demonstrated by the approved Time Impact Analysis. Time extensions shall be granted only if they are clearly demonstrated by the CONTRACTOR through the submittal, within seven (7) calendar days after the delay occurs, of a Time Impact Analysis which demonstrates the estimated impact on the end date of the Work; is based upon the updated Construction Schedule current as of the month the delay occurred; and demonstrates that the delay cannot be mitigated, offset, or eliminated through such actions as revising the intended sequence of Work or other means.

If a time extension if granted by the CITY, the updated schedule reflecting the change shall become the baseline and be reflected schedule and must be shown and compared on all subsequent schedule submittals.

Since float time within the Construction Schedule is jointly owned, it is acknowledged that CITY caused delays on the project may be offset by CITY caused time savings (e.g. critical path submittals returned in less time than allowed by the Contract or approval of substitution requests which result in a savings of time to the CONTRACTOR). In such an event, the CONTRACTOR shall not be entitled to receive a time extension or delay damages until all CITY caused time savings are exceeded and the Contract completion date is also exceeded.

F. If the initial schedule submitted shows completion of Work more than thirty (30) calendar days in advance of the Contract completion date, the ENGINEER may, at no cost to the CITY, decrease the Contract duration by issuance of a Change Order which changes appropriate Milestone Date(s) and the Contract completion date to the completion date reflected on the schedule. Any approved schedule, revision, or update having an early completion date shall show the time between the early completion date and the Contract completion date as "project float".

G. Comments made by the ENGINEER on the schedule during review will not relieve the CONTRACTOR from compliance with all requirements of the Contract. The ENGINEER may request that the CONTRACTOR and all major Subcontractors (defined herein as being any Subcontractor, Sub-Subcontractor, or Supplier with five (5) percent or more of the value of the Contract) participate in

review of any schedule submission. All revisions shall be submitted within seven (7) calendar days after the ENGINEER'S review.

H. Two copies of an updated schedule shall be submitted to the ENGINEER for approval with the submittal of each CONTRACTOR'S monthly payment request or the monthly payment request will be withheld. For those activities started but not yet completed at the time of submittal, the updated schedule shall reflect the percentage complete, as agreed between the CONTRACTOR and the INSPECTOR, and an estimate of the remaining duration. The monthly update of the schedule shall include an updated bar chart with logic arrows or network diagram and include the same additional data as required by Section 1.C. If the CPM network option is used, the schedule shall be calculated using remaining durations and the progress override option. The monthly update shall also include a complete, hard copy list of all the changes made from the previously approved submittal. If the schedule is done using Primavera, use a Claim Digger report for the list of changes.

I. The submittal of an updated schedule which meets the requirements of this Section, accurately reflects the status of the Work (for all previously accepted activities), and incorporates all approved changes into the schedule, shall be a condition precedent to the processing of the monthly payment application. (Actual and/or forecast dates for status of additional submittal cycles shall be added without the prior approval of the Engineer.) Updated schedules shall also be submitted at such other times as the ENGINEER may direct. Upon approval of a Change Order or issuance of a notice to proceed with a change, the approved change shall be reflected in the next schedule update.

J. If completion of any part of the Work, delivery of equipment or materials, or submittal of CONTRACTOR submittals is behind schedule and will impact the end date of the Work, the CONTRACTOR shall submit a written recovery plan acceptable to the ENGINEER for completing the Work by the current Contract completion date, if requested by the ENGINEER.

K. As a condition precedent to the release of any retained funds, the CONTRACTOR shall, after substantial completion of the Work has been achieved, submit a certified, final schedule which accurately reflects the manner in which the project was constructed and includes actual start and completion dates for all activities on the schedule.

END OF SECTION

SECTION 01322 CONSTRUCTION PROGRESS PHOTOGRAPHY

1.1 GENERAL

A. Required**:** Provide photographs taken at the Jobsite at the specified stages of Contracted Work in accordance with provisions of this Section.

1. The Contractor shall provide the City with photos with addresses identifying each property location, the direction the photograph was taken (facing North, South etc).

2. Take first photographs just before CONTRACTOR starts any work operations at the Jobsite.

3. Take final photographs when all Contracted Work has been completed, regardless of time interval since previous photographs were taken.

1.2 SUBMITTALS

Except as otherwise directed by the ENGINEER, submit all photographs electronically on a CD/DVD organized by phase of construction and location.

1.3 QUALITY ASSURANCE

Photographs and prints to be of professional quality; clear, in focus, with high resolution and sharpness, and with minimum distortion.

END OF SECTION

SECTION 01323 CONSTRUCTION STATUS REPORTS

1.1 REQUIREMENTS

A. Daily Status Report

The Contractor shall complete a daily report indicating manpower, major equipment, subcontractors, unusual occurrences and etc., involved in the performance of the work. The daily report shall be completed on forms prepared by the Contractor and approved by the City and shall be submitted to the Project Manager at the conclusion of each work week.

The Contractor shall also have workers on the project sign in and out each day on the City of Redlands Daily Sign In Sheet which shall state the name, times in and out and the work performed by each worker on the project each day. The completed Daily Sign In Sheets shall be submitted to the City of Redlands Project Manager at the end of each work week. Failure to submit daily reports and daily sign in sheets to the Project Manager on a weekly basis will result in a possible and temporary suspension of work until reports are submitted.

B. Weekly Status Report

During the construction phase of the Work, the CONTRACTOR shall submit weekly written status reports to the ENGINEER and the INSPECTOR. The report shall contain a record of inspections and tests, not performed by CITY forces, for all Work accomplished subsequent to the previous report and shall include the following information:

1. Type of work under way during the time frame of the report (e.g., earthwork, concrete work, structural steel erection, equipment manufacturing, component installation).

2. Inspections and tests, and location of inspections and tests that were made.

3. Results of inspections.

4. Reports of tests performed, including those specified, with the results of the tests, and acceptance criteria, including failures and remedial action to be taken. Test results, including all computations, shall be attached to the report form. Where test results cannot be completed by the time the report is submitted, a notation shall be made that the test was performed, including the approximate expected date that test results will be reported.

5. Report of any nonconforming items/activities. Nonconformance report forms designed solely for this purpose shall be utilized.

6. Results of inspections of material and equipment done upon their arrival at the Jobsite and prior to their incorporation into the Work. This includes, but is not limited to, compliance with approved submittals, damage, and proper storage requirements.

7. Offsite quality control activities.

8. Instructions received from the ENGINEER or INSPECTOR.

9. In all cases, the report must be verified and signed by the CONTRACTOR'S representative. The verification is to contain the statement that all supplies and materials incorporated in the Work are in compliance with the terms of the Contract except where noted.

C. 3 Week Look Ahead Schedule

During the construction phase of the Work, the CONTRACTOR shall submit 3 Week Look Ahead reports to the ENGINEER at the weekly progress meetings or as directed by the ENGINEER. The report shall include the following information:

1. Type of work under way during the time frame of the report (e.g., earthwork, concrete work, structural steel erection, equipment manufacturing, component installation).

D. Miscellaneous Submittals

CONTRACTOR shall prepare a Daily Construction Report recording the following information concerning events at the job-site and submit original copies to the ENGINEER at weekly intervals for approval:

1. List of Subcontractors and Sub-Subcontractors at the site**,** types of works and job location.

2. Count of CONTRACTOR’S personnel at the site**,** name, type of work, hours completed and job location.

3. Construction equipments at the site.

4. High and low temperatures, general weather conditions.

END OF SECTION

SECTION 01330 SUBMITTALS

1.1 THE REQUIREMENT

A. The CONTRACTOR shall furnish a schedule and list of all required submittals to the ENGINEER, including required submittals by all Subcontractors.

B. Wherever called for in these Specifications or on the plans, or where required by the ENGINEER, the CONTRACTOR shall furnish to the ENGINEER for review, two (2) hard copies and one electronic (PDF) copy of each submittal. The term "submittal" as used herein shall be understood to include detail design calculations, design drawings, shop drawings, fabrication and installation drawings, erection drawings, lists, graphs, operating instructions, catalog sheets, data sheets, samples, and similar items. Unless otherwise required, said submittals shall be submitted to the ENGINEER at a time sufficiently early to allow review of same by the ENGINEER and to accommodate the rate of Construction Progress required under the Contract without delaying the Contract Work and with due regard for the possibility of resubmittals. All submittals shall be in English.

C. All design or shop drawings or other submittals shall be accompanied by a transmittal form for each submittal. Any submittal not accompanied by such a form may be returned, at the ENGINEER'S discretion, for resubmittal.

D. Normally, a separate transmittal form shall be used for each specific item or class of material or equipment for which a submittal is required. Transmittal of a submittal of various items using a single transmittal form will be permitted only when the items taken together constitute a manufacturer's "package" or are so functionally related that expediency indicates a review of the group or package as a whole. A multiple-page submittal shall be collated into sets, and each set shall be stapled or bound, as appropriate, prior to transmittal to the ENGINEER.

E. Shop Drawings shall show in detail the size, sections, and dimensions of all the member(s); the arrangement and construction of all connections and joints; all holes, straps, and other fittings required for attaching work and other pertinent details. When required, engineering computations shall be submitted. The CONTRACTOR shall be responsible for delivering reviewed copies of shop Drawings to all others whose work is dependent thereon. The CONTRACTOR shall maintain at the site of the Project, at all times, a complete file of approved Shop Drawings and manufacturers' data for this Project.

F. Except as may otherwise be provided herein, the ENGINEER will return prints of each submittal to the CONTRACTOR, with its comments noted thereon, within twenty (20) calendar days following their receipt by the ENGINEER. It is considered reasonable that the CONTRACTOR shall make a complete and acceptable submittal to the ENGINEER by the second submission of a submittal

item. The CITY reserves the right to withhold moneys due the CONTRACTOR to cover additional costs of the ENGINEER'S review beyond the second submittal. Submittal will be returned to the CONTRACTOR with one of four (4) markings:

1. If a submittal is returned to the Contractor marked "NO EXCEPTIONS," formal revision and resubmission of said submittal will not be required.

2. If a submittal is returned to the Contractor marked "EXCEPTIONS NOTED," formal revision and resubmission of said submittal will not be required, unless specifically requested.

3. If a submittal is returned to the Contractor marked "RETURNED FOR CORRECTION," the Contractor shall revise said submittal and shall resubmit the originally required number of copies of said revised submittal to the Engineer.

4. If a submittal is returned to the Contractor marked "NOT ACCEPTABLE," the Contractor shall revise said submittal and shall resubmit the originally required number of copies of said revised submittal to the Engineer.

G. All Work for which Shop Drawings are required shall be performed in accordance with the reviewed and approved copies. Fabrication of an item shall not commence before the ENGINEER has reviewed the pertinent submittal and returned the copies to the CONTRACTOR marked either "NO EXCEPTIONS TAKEN," or "MAKE CORRECTIONS NOTED“. Revisions indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as the basis for claims for extra work.

H. All CONTRACTOR submittals shall be carefully reviewed by an authorized representative of the CONTRACTOR prior to submission to the ENGINEER. Each submittal shall be dated, signed, and certified by the CONTRACTOR as being correct and in strict conformance with the Contract Documents. No consideration for review by the ENGINEER of any CONTRACTOR’S submittal will be made for any items which have not been so certified by the CONTRACTOR. All noncertified submittals will be returned to the CONTRACTOR without action taken by the ENGINEER, and any delays caused thereby shall be the total responsibility of the CONTRACTOR.

I. Should the Shop Drawings or manufacturers data (for submittals required by the Standard Specifications or the specifications) show variations from the Contract requirements, the CONTRACTOR shall make specific mention of such variations in the letter of transmittal, in order that, if acceptable, suitable action may be taken for proper adjustment of the Contract; otherwise the

CONTRACTOR will not be relieved of the responsibility for executing the work in accordance with the Contract Documents, and the approved submittals.

J. The ENGINEER'S review of CONTRACTOR'S submittal shall not relieve the CONTRACTOR of the entire responsibility for the correctness of details and dimensions and conformance to the Specifications. The CONTRACTOR shall assume all responsibility and risk for any misfits due to any errors in the submittal. Any fabrication or other work performed in advance of the receipt of accepted submittals shall be entirely at the CONTRACTOR'S risk and expense. The CONTRACTOR shall be responsible for the dimensions and the design of adequate connections and details.

K. CONTRACTOR'S Coordination:

1. ENGINEER will return and will not review unrelated submittals.

2. The CONTRACTOR may be required to provide drawings, setting diagrams and similar information necessary for proper coordination of Contracted Work. Such data shall remain between the CONTRACTOR and CONTRACTOR'S Subcontractor and will not be reviewed by the ENGINEER unless specifically called for in the Contract Documents.

3. ENGINEER will not review any required Structural Shop Drawings, Structural Calculations, etc., not prepared or signed by a State of California licensed ENGINEER.

4. ENGINEER will return and will not review any submittal requiring coordination with other submittals until such other submittals or required information is received by the Consultant or ENGINEER.

L. CONTRACTOR'S Submittals: CONTRACTOR'S submittals required for performance of Contracted Work, shall include, but are not limited to, the following:

1. Schedule of Values for all Lump Sum items within the Proposal.

2. Construction Schedule and Notification to ENGINEER of completion of each milestone or percentage increment of the Work as required.

3. Submittal Schedule

4. Daily Construction Reports

5. Shop Drawings and Structural Calculations.

6. Manufacturer's Data and Specifications.

7. Samples

8. Templates

9. Certificate of Compliance

10. Construction Photographs

11. Substitutions

12. Record Drawings and Record Project Manual

13. Operation & Maintenance Manuals

14. Stock Materials, Spare parts, tools

15. Material Testing Results

16. Maintenance Logs and Maintenance Schedule.

M. CONTRACTOR shall conform to the provisions of the Contract Document and as may be specifically directed by the ENGINEER.

1. Preparation and processing of submittals shall be coordinated with Contracted Work operations, which include fabrication, purchasing and delivery of work items so as not to delay Contracted Work operations.

2. In each copy of the Submittal, mark every applicable material, product, equipment, manufacturer's data, product information, color samples, rating or values, part and model numbers, etc. by red color circle. Each of the submittal items must be clearly distinguishable from other unrelated or similar items listed in the Manufacturer's Catalog or Technical Specifications, Manuals, etc.

N. Coordination and Submittals:

1. Carefully review and coordinate all aspects of each item being submitted.

2. Carefully review contract drawings and technical sections, verify all work as laid out or indicated meeting the applicable codes and standards.

3. Ensure ample time for reviewing and processing of the submittals by the CITY or other authorized agencies, delays resulting from improper and untimely submittals shall be the responsibility of the CONTRACTOR.

4. Verify that all such submittal items conform to the Project Manual requirements noted in the Technical Sections.

5. Verify all site conditions and provide all required dimensions and measurements in Shop Drawings.

6. Where necessary, review the CITY'S comments, make changes and resubmit to local governing agencies for approval. Furnish the ENGINEER copies of the approved plans or drawings for review.

O. CONTRACTOR shall affix to each submittal, the CONTRACTOR'S signature certifying that required coordination has been performed and include on an attached label for processing and recording action taken, noting the following:

1. Name of the Project

2. Date of the Submittal

3. Name and address of Consultant

4. Name and address of the CONTRACTOR

5. Name and address of the Subcontractor(s)

6. Name and address of the Supplier

7. Name and address of the Manufacturer

8. Reference to Specification Section Number and Title

9. Reference to Drawing Sheet Number and detail(s)

10. Submittal Number

11. Priority Number and expected return date.

END OF SECTION

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THE CITY OF REDLANDS
MUNICIPAL UTILITIES AND ENGINEERING DEPARTMENT

SUBMITTAL COVER SHEET

Project Name:		**Submittal Number:**	
Project Number:		**Date of Submittal:**	
Submitted By:			

Submittal Title:	

Priority Type (Select One):	☐ Low	☐ Normal	☐ High

Submittal Type (Select One):	☐ Pre-Construction	☐ Post-Construction

Category (Select One):	
☐ Product Data	☐ Close-Out
☐ Shop Drawing	☐ Warranty
☐ Mock Up	☐ Test Report
☐ Sample	☐ Operation / Maintenance Manual
☐ Certification	☐ MSDS – Material Safety Data Sheets
☐ As-Built	

THE CITY OF REDLANDS
MUNICIPAL UTILITIES AND ENGINEERING DEPARTMENT

REQUEST FOR INFORMATION (RFI)

Project Name:		**RFI Number:**	
Project Number:		**Date of RFI:**	
Submitted By:			

RFI Title:	

Work Impact? (Select One):	☐ No	☐ Unknown
	☐ Yes – Work Impeded	☐ Yes – Work Stopped

Question:

Proposed Solution (Optional):

Requestor:

Signature: _____

Title: _____ **Date:** _____

SECTION 01571 STORMWATER POLLUTION PREVENTION PLAN

PART 1 - GENERAL

This project is subject to the requirements of the General Permit for Storm Water Discharges associated with Construction and Land Disturbance Activities, under the California State Water Resources Control Board. Order No. 2009-0009-DWQ, CAS000002, and all amendments. All permit related documents can be located at the State Water Resources Control Board (SWRCB) website at www.waterboards.ca.gov. This project lies within the boundaries of the Santa Ana Regional Water Quality Control Board (RWQCB). The project is also covered by the municipal MS4 permit, Santa Ana-Order No. R8-2010-0036. Guidance manuals applicable to this project are the California Best Management Practices Handbooks found at www.cabmphandbooks.com.

The Contractor shall be responsible for complying with the SWPPP and all laws, codes, ordinances, and requirements of the governing agencies regarding the discharge of pollutants, pollution control devices, and any other related stormwater and non-stormwater requirements for this project, including but not limited to reporting, sampling, and amendments.

The Contractor shall have the necessary training and certifications to implement the SWPPP, conduct inspections and maintain the required water pollution control practices. See Section "QUALIFIED SWPPP PRACTITIONER (QSP)".

The Contractor shall follow all requirements of the prepared job specific Storm Water Pollution Prevention Plan (SWPPP) including the Construction Site Monitoring Program Requirements (CSMP). The contractor shall provide a Qualified SWPPP Practitioner (QSP) to implement all requirements of the SWPPP. The QSP shall be responsible for monitoring and sampling as required by the CSMP.

Approval of the SWPPP must be completed prior to the start of construction activity. However, the contract time will commence.

PART 2 - STORMWATER POLLUTION PREVENTION PLAN PREPARATION

If required under Order No. 2009-0009-DWQ, CAS000002, or its amendments, the Contractor shall prepare a SWPPP for the project. The SWPPP provides the general stormwater approach for the project and the minimum necessary BMPs. The contractor shall provide a Qualified SWPPP Practitioner (QSP) for this project and submit to the City copies of the required certifications or registrations for the QSP prior to SWPPP approval.

The California Storm water Quality Association (CASQA) has prepared a SWPPP template for use with Order No. 2009-0009-DWQ, CAS000002. The SWPPP template provides the general storm water approach for the project and the minimum necessary BMPs. The SWPPP template is not to be a considered a final and complete document until it has been completed and approved by a Qualified SWPPP Developer (QSD). The QSD is expected to include in the updated Final

SWPPP necessary details pertaining to the methods and scheduling of construction and any additional necessary BMPs, based on the project approach.

The QSD shall use the CASQA SWPPP template for preparation of the SWPPP. The Caltrans SWPPP template shall not be used.

Within 5 days of the Notice to Proceed, Contractor shall submit two (2) hardcopies of the draft Storm Water Pollution Prevention Plan (SWPPP) for review. SWPPP review shall be in accordance with the requirements set forth in Section 01330 of the General Requirements. Once all of the noted revisions have been made and the SWPPP is complete for submittal to the State, two (2) final signed hardcopies and one (1) electronic copy of the SWPPP must be submitted to the Engineer for acceptance. The Contractor shall keep one copy of the approved SWPPP and approved amendments at the project site. The SWPPP shall be made available upon request by a representative of the City of Redlands, the Regional Water Quality Control Board or the State Water Resources Control Board. Requests made by the public or other third-parties for review of the SWPPP shall be directed to the Project Engineer. The Contractor shall notify the Engineer immediately when regulatory agencies request to enter, inspect, sample, monitor, or otherwise access the project site or the Contractor's records pertaining to the water pollution control work. Contractor shall immediately send all correspondences, notices of violation, enforcement actions or proposed fines, issued by a regulatory agency, to the Engineer.

The SWPPP shall be updated or amended as necessary or as required for compliance purposes. All updates to the SWPPP shall be per the guidelines contained therein. A copy of the SWPPP must be kept at the project site at all times. In the case of a linear construction project (water, sewer, street), where no field office has been established, the copy of the SWPPP shall be kept by the contractor's foreman in the vicinity of the actual construction and made available within thirty (30) minutes of request. The SWPPP shall be made available upon request by a City Inspector, a representative of the Regional Water Quality Control Board or the State Water Resources Control Board. Requests made by the public or other third parties for review of the SWPPP shall be directed to the City Engineer.

PART 3 - SWPPP IMPLEMENTATION

Unless otherwise specified, the Contractor shall be responsible throughout the duration of the project for installing, constructing, inspecting, maintaining, removing, and disposing of the water pollution control devices; and practices specified in the SWPPP, its amendments, or by the City Inspector. Unless otherwise directed by the City Engineer, the Contractor's responsibility for SWPPP implementation shall continue throughout temporary suspensions of work, regardless of reason, unless specified otherwise in writing by the City Engineer. Requirements for installation, construction, inspection, maintenance, removal, and disposal of water pollution control devices and practices shall conform to the requirements in the SWPPP and these special provisions.

The National Weather Service (http://www.srh.noaa.gov/) weather forecast shall be monitored and used by the Contractor on a daily basis. If there is a forecast of 50% or greater probability of precipitation in the project area, the necessary water pollution control devices, plans and practices shall be deployed prior to the onset of the precipitation and immediate notice provided

to the City Engineer. The contractor's QSP shall be required to prepare and submit a Rain Event Action Plan (REAP), if required, any time the probably of rainfall is 50% or greater.

For the purposes of erosion and sediment control, disturbed soil areas shall be considered active whenever the soil disturbing activities have occurred, continue to occur or will occur during the ensuing 14 days. Non-active areas shall be protected as prescribed in the General Construction Permit within 14 days of cessation of soil disturbing activities or prior to the onset of precipitation, whichever occurs first.

If the City Inspector finds the contractor is not in compliance with the SWPPP or any other applicable pollution control laws or regulations, the City Inspector shall direct the contractor to correct the violation. The Contractor shall immediately take measures to correct the violation or notify the City Engineer in writing why correcting the violation immediately is not possible and provide a timetable by which the violation will be corrected. The City Engineer may accept the timetable, reject it or modify it. Under no circumstances will the contractor submit a timetable that exceeds the duration of construction in the immediate area. If the Contractor fails to correct the identified violation by the date agreed upon or prior to the onset of precipitation, the project shall be in nonconformance with these specifications and subject to the remedies as described in Section "LEGAL RELATIONS AND RESPONSIBILITY".

Installing, inspecting and maintaining water pollution control practices on areas outside the City of Redlands right of way, not specifically arranged and provided for by the City of Redlands in the execution of this contract, will not be paid for without prior written approval.

No work required by regulatory agencies, and for which the Contractor would request additional compensation from the City, shall be started without prior approval from the City Engineer.

PART 4 - MAINTENANCE

To ensure the proper implementation and correct functioning of water pollution control devices and practices, the Contractor shall assign a Qualified SWPPP Practitioner (QSP) to regularly inspect and maintain the construction site's water pollution control devices and practices as identified in the SWPPP. The frequency of the inspections shall be in accordance with the SWPPP. In the event of multiple consecutive violations, the City Engineer may increase the frequency of the inspections. These additional inspections shall be at the Contractor's expense based on the current adopted resolution establishing such fees.

The QSP/Contractor shall document the inspections findings, using photographs and a written narrative, and if necessary, make the necessary corrections to the water pollution control practices or devices. One copy of each site inspection record shall be submitted to the City Engineer within 5 working days of completing the inspection. The QSP/Contractor shall submit one copy of each Rain Event Action Plans (REAP), when required, within 12 hours of anticipated precipitation event. The QSP/Contractor shall also submit one copy of each monitoring/sampling report, when required, within 24 hours of receiving the results. The contractor shall be responsible for all expenses incurred in the reporting process.

PART 5 - REPORTING REQUIREMENTS - DISCHARGE

If the Contractor identifies discharges leaving the construction site or flowing into drainage systems or surface waters in a manner causing, or potentially causing, a condition of pollution, or if the project receives a written notice or order from a regulatory agency, the Contractor shall immediately inform the City Engineer. The Contractor shall submit a written report to the City Engineer in less than 24 hours of the discharge event, notice, or order. The report shall include the following information:

A. The date, time, location, nature of the operation, and type of discharge, including the cause or type of the notice or order Contractor received.

B. The water pollution control practices deployed before the discharge event, or prior to receiving the notice or order.

C. The date of deployment and type of water pollution control practices deployed after the discharge event, or after receiving the notice or order, including additional measures installed or planned to reduce or prevent reoccurrence.

D. An implementation and maintenance schedule for affected water pollution control practices.

The contractor shall also submit any reports required by the SWPPP or the General Permit for Storm Water Discharges associated with Construction and Land Disturbance Activities to the appropriate agencies. The contractor shall be responsible for all expenses incurred in the reporting process. Any required sampling shall be done by the contractor or his QSP in compliance with the SWPPP.

PART 6 - REPORTING REQUIREMENTS – ANNUAL REPORT and NOTICE OF TERMINATION

The contractor shall be responsible for preparing the Annual Report. The Annual report shall be prepared per Section XVI. ANNUAL REPORTING REQUIREMENTS of the General Permit for Storm Water Discharges associated with Construction and Land Disturbance Activities, under the California State Water Resources Control Board. Order No. 2009-0009-DWQ, CAS000002. The Annual Report must be prepared by or under the direction of a QSP.

1) The contractor or QSP shall prepare an Annual Report no later than August 15th of each year.

2) The contractor or QSP shall certify each Annual Report in accordance with the Special Provisions.

3) The contractor or QSP shall retain an electronic or paper copy of each Annual Report for a minimum of three years after the date the annual report is filed.

4) The contractor or QSP shall include storm water monitoring information in the Annual Report consisting of:

   a) A summary and evaluation of all sampling and analysis results, including copies of laboratory reports;

   b) The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit");

   c) A summary of all corrective actions taken during the compliance year;

   d) Identification of any compliance activities or corrective actions that were not implemented;

   e) A summary of all violations of the General Permit;

   f) The names of individual(s) who performed the facility inspections, sampling, visual observation (inspections), and/or measurements;

   g) The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation (rain gauge); and

   h) The visual observation and sample collection exception records and reports specified in Attachments C, D, and E.

5) The contractor or QSP shall provide training information in the Annual Report consisting of:

   a) Documentation of all training for individuals responsible for all activities associated with compliance with this General Permit; 2009-0009-DWQ 40 September 02, 2009 Order 2009-0009-DWQ 41 September 02, 2009

   b) Documentation of all training for individuals responsible for BMP installation, inspection, maintenance, and repair; and

   c) Documentation of all training for individuals responsible for overseeing, revising, and amending the SWPPP.

A copy of the Annual Report shall be submitted to the City no later than 9 A.M. each August 15th. In the event August 15th is a Friday, Saturday, or Sunday, the report shall be submitted no later than 5 P.M. on the Thursday prior to August 15th. If the project is completed prior to August 1st, regardless of when the project started, the Annual Report is due within two weeks of project completion. The contractor shall submit two hard copies of the annual report and one digital copy in PDF format on compact disc (CD).

Failure to submit the Annual report within the timeframes specified will result in progress payments and/or retention release being delayed and/or withheld. The City of Redlands, at its discretion, may complete the annual report based on records provided by the contractor. The contractor shall reimburse the city the full cost of creating the Annual Report along with an administrative fee not to exceed 1.7 times the total cost. The contractor shall also be liable for any fines or judgments levied by the Regional Water Quality Control Board against the City of Redlands as a result of the contractors failure to provide the annual report within the time frames listed above.

Under no circumstances does the submittal of a copy of the Annual Report to the City of Redlands relieve the contractor of his responsibility to maintain the Annual Report records for a minimum of three years after the date of submittal.

The contractor shall be responsible for preparing the Notice of Termination. The Notice of Termination shall be prepared within 30 days of the cessation of construction and shall meet all the requirements of the General Permit for Storm Water Discharges associated with Construction and Land Disturbance Activities, under the California State Water Resources Control Board. Order No. 2009-0009-DWQ, CAS000002. The Notice of Termination must be prepared by or under the direction of a QSP.

Along with submitting the Notice of Termination to the City of Redlands, the QSP shall submit one (1) hard copy and one (1) electronic copy of the Storm Water Pollution Prevention Plan (SWPPP), including all inspection reports, photographs and other documents as required by the General Permit for Storm Water Discharges associated with Construction and Land Disturbance Activities, under the California State Water Resources Control Board. Order No. 2009-0009-DWQ, CAS000002, to the Engineer.

PART 7 - WATER POLLUTION BEST MANAGEMENT PLAN (BMP) BUDGET

The Contractor shall submit a completed Water Pollution BMP budget, which itemizes the BMPs for water pollution control work. The Contractor shall identify items, quantities, and values for all water pollution control work. The Water Pollution BMP budget shall provide a cost breakdown for the water pollution control work based on BMP quantity, unit cost, and total amount.

The Contractor shall be responsible for the accuracy of the quantities and values used in the Water Pollution BMP budget. Partial payment for the item of water pollution control will not be made until the Water Pollution BMP budget is approved by the Engineer. Overhead and profit, except for time-related overhead, shall be included in the individual line items listed in the Water Pollution BMP budget. Line item quantities indicated in the Water pollution BMP budget in this section shall be considered project-specific minimums. All the BMPs listed in the Water Pollution Control BMP budget can be referenced in the CASQA Construction BMP Handbook.

PART 8 - PAYMENTS AND PENALTIES

The Water Pollution BMP budget shall include full compensation for furnishing labor, materials, tools, equipment and incidentals for doing all the work involved in reviewing, updating, and implementing a Storm Water Pollution Prevention Plan, including installing, constructing, removing and disposing of water pollution control devices and practices, and non-stormwater management and waste management and no additional compensation will be allowed, unless there is a separate prior approval in writing by the City Engineer.

It shall be understood that the City of Redlands and/or the City Engineer's acceptances does not relieve the Contractor of his/her full responsibility, legally and/or financially, to repair damages resulting from inadequacy and/or insufficiency of water pollution control devices and practices that were installed by the Contractor during construction activity.

PART 9 - LEGAL RELATIONS AND RESPONSIBILITY

The City Inspector may use any of the following measures if violations are not corrected in a timely manner or if the violation may present a danger to public health or to the environment; notices of correction or violation, stop work orders, citations, and using City staff or third party contractors to correct the problem. In the event that the above measures do not resolve the issues, the City Inspector shall inform the State Water Resources Control Board (SWRCB) of the violation and request their intervention.

The Contractor shall be solely responsible for penalties assessed or levied on the Contractor or the City of Redlands as a result of the Contractor's failure to comply with the provisions in this section, including but not limited to, compliance with the applicable provisions of the Permits, the Manuals, and Federal, State and local regulations and requirements as set forth, therein. Penalties shall also include payment made or cost incurred in settlement for alleged violations of the Permits, the Manuals, or applicable laws, regulations or requirements, Costs incurred could include sums spent instead of penalties, in mitigation or to remediate or correct violations. This shall apply regardless of the source issuing the penalties.

In the event a stop work order has been issued, the days passing between the discovery of the violation until the violation has been resolved and the stop work order has been lifted, shall be considered "working" days and shall not negate any claims by the City of Redlands for liquidated damages.

If the Contractor fails to correct violations immediately or within the time table established with the City Engineer, the City of Redlands may elect to use City staff or a third party to bring the project into compliance. The Contractor shall be responsible for the cost incurred by the City of Redlands when using City staff or a third party to bring the project into compliance. The City of Redlands reserves the right to add an additional fifteen (15) percent to the costs to cover administrative expenses.

PART 10 - RETENTION OF FUNDS

Notwithstanding any other remedies authorized by law, the City of Redlands may retain money due the Contractor under the contract, in an amount determined by the City, up to and including the entire amount of penalties proposed, assessed or levied as result of the Contractor's violation of the Permits, the Manuals, or Federal or State law, regulations or requirements. Funds may be retained by the City until final disposition has been made as to the Penalties. The Contractor shall remain liable for the full amount of penalties until such time as they are resolved with the entity seeking the penalties.

When a regulatory agency or third party identifies a failure to comply with the Permits and modifications, thereto, the Manuals, or other Federal, State or local requirements, the City of Redlands may retain money due to the Contractor, subject to the following:

A. The amounts retained, due to Contractor's failure to conform to the provisions in this section, will be released for payment on the next monthly estimate for partial payment providing the corrections have been implemented and maintained and when water pollution has been adequately controlled, as determined by the City Engineer.

During the estimated period that the Contractor fails to conform to the provisions in this section, the City may retain an amount equal to 25 percent of the estimated value for the contract work performed.

PART 11 - QUALIFIED SWPPP PRACTITIONER (QSP)

The General Construction Permit requires a Qualified SWPPP Practitioner (QSP) to oversee implementation of the BMPs and to ensure proper project oversight. Any contractors bidding and/or awarded a contract for any projects for the City of Redlands subject to the provisions of the General Permit shall employ a QSP. Prior to being awarded a construction contract, the successful bidder shall submit the name of the QSP to the City or Redlands for approval.

The QSP shall be responsible for the elimination of all unauthorized discharges and the preparation and submittal of an annual compliance evaluation report.

END OF SECTION

SECTION 01721 MOBILIZATION

1.1 THE REQUIREMENT

A. General

Whether Mobilization is included as a Contract Bid Item in the Bid Proposal Form or specified as part of the lump sum in the Contract Documents, the cost of labor, equipment, materials and incidentals for doing all the work in mobilization (in advance of construction operations and not directly attributable to any specific bid item) shall be included in the Contract Price Breakdown and progress payment estimate. If there is no mobilization bid item the CONTRACTOR shall submit to the INSPECTOR for approval the Contract Price Breakdown with the amount established for mobilization.

Mobilization shall include, but not be limited to, the following items, all as required for the proper performance and completion of the Work:

1. Obtaining all permits, licenses, insurance, and bonds. Providing copies to the ENGINEER.

2. Moving onto the Jobsite all of CONTRACTOR'S plant and equipment as required.

3. Erecting temporary buildings and other construction facilities.

4. Installing temporary construction power and wiring.

5. Establishing fire protection system for its temporary facilities.

6. Developing construction water supply.

7. Providing field office trailers for the CONTRACTOR, complete with all specified equipment, furnishings, utility services and required approvals from the CITY.

8. Providing sanitary facilities or connecting to onsite sanitary facilities as specified.

9. Providing for potable water facilities as specified. This includes a means by which all on site CONTRACTOR, Subcontractor or supplier personnel can wash their hands with soap.

10. Arranging for, and erection of, CONTRACTOR'S work and storage yards and sheds.

11. Submitting all required Subcontractor insurance certificates and bonds.

12. Posting all CAL/OSHA required notices and establishment of safety programs.

13. Furnishing of Construction Schedule, Contract Price Breakdown and Submittal Schedules.

14. Erecting all temporary fencing, including removal and disposal of existing temporary fencing.

END OF SECTION

SECTION 01722 SURVEYING

PART 1 - GENERAL

A. General

1. The CONTRACTOR shall be responsible for all surveys required to layout the Work and for the accuracy of all survey work for construction. The CONTRACTOR shall include the cost of all such survey work in their Bid. The CONTRACTOR shall have all construction surveying performed by a `Licensed Land Surveyor' or a `Civil Engineer' registered by the State of California to perform such work. The ENGINEER reserves the right to verify all survey work done by the CONTRACTOR.

2. The CONTRACTOR shall preserve the initial survey control points for the duration of their usefulness. Monumentation that is subject to disturbance or destruction shall be located and referenced prior to construction and relocated and referenced if necessary after construction, in accordance with the following requirements.

B. Construction Surveys

1. The CONTRACTOR shall provide all reference stakes and form checks necessary for construction and inspection of improvements. All construction staking shall be documented in cut sheets and provided to the ENGINEER. This staking may include but is not limited to: removals, joins, rough grade, slope, utilities, storm drains, sewers, curbs, walks, paving, wall and building stakes; and any other staking necessary for construction and inspection.

C. Reference Or Grade Stakes

1. A reference or grade stake shall be set for each grade change or angle point shown on the plan, standard plan, and shop drawing, in addition to the normal staking interval.

D. Form Checks

1. Forms shall be checked when durable points may be disturbed, removed, or are impractical to be used to verify the design location. The measured location shall be recorded in the survey field notes. All variations from the plan location shall be brought to the attention of the ENGINEER.

E. Staking Intervals And Offset Stake Lines

1. All staking intervals shall be in accordance as directed by the Engineer. Stake lines shall be set at an offset distance from the improvement to ensure proper grade, station, and alignment.

F. Utility Stakes

1. The CONTRACTOR shall provide stakes for all utilities, public or private, that require location or relocation, unless otherwise stated.

G. Additional Survey Work

1. The CONTRACTOR may be required to furnish additional survey work, such as profiles, restakes, Change Orders, etc., at the request of the ENGINEER or the INSPECTOR.

H. Accuracy

1. The CONTRACTOR shall use appropriate surveying methods to obtain the following standards: For fixed works (i.e. cast-in-place concrete; asphalt pavement, pipes and drains; and other items determined by the ENGINEER) the following survey standards shall be used. The absolute horizontal accuracy, in relationship to the Engineer's control, shall be such that the semimajor axis of its 95% error ellipse is ±0.015 foot or less. The absolute vertical accuracy, in relationship to the Engineer's control, shall be such that its standard deviation is ±0.015 foot or less. The relative horizontal accuracy of survey points within the Project shall be such that the semimajor axis of its 95% error ellipse is ±0.015 foot or less. The relative vertical accuracy of survey points within the Project shall be such that its standard deviation is ±0.015 foot or less.

2. For excavation purposes, the following survey standards shall be used. The absolute horizontal accuracy, in relationship to the Engineer's control, shall be such that the semimajor axis of its 95% error ellipse is ±0.1 foot or less. The absolute vertical accuracy, in relationship to the Engineer's control, shall be such that its standard deviation is ±0.1 foot or less. The relative horizontal accuracy of survey points within the Project shall be such that semimajor axis of the 95% error ellipse is ±0.1 foot or less. The relative vertical accuracy of survey points within the Project shall be such that its standard deviation is ±0.1 foot or less.

I. Survey/Inspector

1. The CONTRACTOR shall provide to the INSPECTOR those measurements and control points necessary to determine the location and conformance to the plan, line, and grade of the improvements necessary for inspection purposes.

J. Survey Notes

1. The CONTRACTOR shall supply and keep notes on CITY standard format note sheets. The ENGINEER may request copies of, and otherwise review, survey notes at any time during the construction phase of the Project. Upon completion of the Project, the original survey notes shall become the property of the CITY and shall be delivered to the ENGINEER

PART 2 – MONUMENT PRESERVATION GUIDELINES

A. New & Reconstruction Projects

1. Prior to Construction

a. The public survey records are to be researched for the location of all possible survey monuments within the scope of the project and copies shall be furnished to the survey crew.

b. The survey crew shall diligently search for all survey monuments of record above or below the surface, within the road right-of-way. It is suggested that this search would include the use of a metal detector. When the detector indicates the possibility of a buried survey monument, then digging below the surface to uncover the monument is required.

c. The survey crew shall properly reference all found survey monuments, which may be disturbed or covered during construction, to stable surface points.

d. The authorized surveyor shall properly complete a Corner Record or Record of Survey for the monuments noted in item c, above. Prior to the start of any construction work, the original or a print of the Corner Record or Record of Survey shall be submitted to the County Surveyor for review, signature and filing. A copy shall also be provided to the City prior to the start of construction to provide documentation that the requirement is met.

2. After Construction and Prior to Notice of Completion

a. All covered and disturbed monuments shall be reset with the same or more durable type of monument as the original, in the surface of the construction. Key monuments shall be a minimum 1” inside diameter iron pipe of appropriate length.

b. A monument box or other protective structure is recommended to be placed around key monuments (section corners, quarter section corners).

c. The authorized surveyor shall properly completes a Corner Record or Record of Survey for all set monuments with a change in character, including tag number, and submit it to the County Surveyor for review, signature and filing. A copy shall also be provided to the City prior to the Notice of Completion to provide documentation that the requirement is met.

B. Overlay Projects

1. Prior To Construction

   a. The public survey records are to be researched for the location of all possible survey monuments within the scope of the project and copies shall be furnished to the survey crew.

   b. The survey crew shall diligently search for all survey monuments of record and on the surface of the road. It is suggested the search would include the use of a metal detector. When the detector indicates the possibility of a buried survey monument, then digging below the surface to uncover the monument within 2" of the road surface is recommended.

   c. The survey crew shall properly reference found survey monuments, which may be disturbed or covered during construction, to stable surface points.

   d. The authorized surveyor shall properly complete a Corner Record or Record of Survey for the monuments noted in item 3, above. Prior to the start of any construction work, the original or a print of the Corner Record or Record of Survey shall be submitted to the County Surveyor for review, signature and filing. A copy shall also be provided to the City prior to the start of construction to provide documentation that the requirement is met.

2. After Construction and Prior to Notice of Completion

   a. All covered or disturbed monuments and surface monuments are reset in the new road surface, or a new monument is set in the new road surface above the buried one.

   b. All existing monument boxes will be adjusted to grade or replaced, as appropriate.

   c. A monument box or other protective structure should be placed around key monuments (section corners, quarter section corners).

   d. The authorized surveyor shall properly complete a Corner Record or Record of Survey for all set monuments and existing monuments with a change in character, including tag number and submits it to the County Surveyor for review, signature and filing. A copy shall also be provided to the City prior to the Notice of Completion to provide documentation that the requirement is met.

C. Slurry Seal Projects

1. Prior To Construction

a. The public survey records are to be researched for the location of all possible survey monuments within the scope of the project and copies furnished to for the survey crew.

b. All monument boxes shall be located and steps taken to ensure that the survey monuments inside are readily accessible upon completion of the project.

c. The survey crew shall diligently searches for survey monuments on the surface of the roadway, and identify said monuments recovered in the field to ensure that they will be protected. The survey crew shall inventory the monuments recovered in the field in a manner that allows for their recovery and inspection after construction.

2. After Construction and Prior to Notice of Completion

a. All monument boxes shall be inspected, and appropriate action taken when needed, to ensure that the survey monuments inside are readily accessible.

b. The survey crew shall review the inventory of found monuments by field inspection to ensure that all survey monuments are clean and exposed. Those monuments covered after construction is completed shall be uncovered.

D. Monument Tie Preservation

1. Prior To Construction

a. All existing survey monument ties within the scope of the project shall be researched and identified prior to construction. Surveyor may obtain existing tie sheets from the City as available.

b. If it is determined that all ties for a survey monument may be disturbed during construction, the Surveyor shall relocate the monument ties prior to construction, within improvements that will not be disturbed, and file the revised tie sheet with the City. A minimum of three tie points should reference each centerline monument, whenever possible

2. After Construction and Prior to Notice of Completion

a. If it is determined that the result of construction will not disturb all survey monument ties for a specific monument, the Surveyor shall replace all monument ties disturbed during construction per the following guidelines:

i. Monument ties shall be placed during the finishing process of the concrete improvements.
ii. Monument ties shall be set below the elevation of the adjacent top of curb to provide protection from any future cleaning, maintenance or work around the tie.
iii. A minimum of three tie points should reference each centerline monument, whenever possible.

b. Once the construction is complete, the Surveyor shall prepare a revised tie sheet, and file with the City for all monument ties disturbed during the construction.

END OF SECTION

SECTION 01732 POTHOLING

1.1 THE REQUIREMENT

A. The CONTRACTOR shall conduct exploratory excavations by potholing to verify or to discover the actual locations and the size of existing underground utilities and improvements. The CONTRACTOR shall take care not to damage existing facilities during potholing operations. Any utility or existing facility (including those located by Underground Service Alert - USA) within 3 feet of any trench or excavation shall be potholed prior to starting the contract work in the vicinity. Potholing shall be done in each given area where excavation work is to occur at least fourteen (14) calendar days in advance of any excavation or construction in that area, to avoid possible delay in the progress of the Work.

B. Potholing shall consist of excavations at the locations of utilities or other underground facilities indicated on the Drawings, located by USA, or as directed by the ENGINEER. All costs of potholing operations for the utilities indicated on the Drawings shall be included in the CONTRACTOR'S Bid.

C. If an allowance for "Additional Potholing" has been established and included in the SCHEDULE OF WORK AND PRICES, this allowance shall only be used to reimburse the CONTRACTOR for potholing utilities not shown or otherwise referenced on the drawings, or as directed by the ENGINEER. If the total cost of the Work directed under the Additional Potholing allowance differ from the amount set forth in the SCHEDULE OF WORK AND PRICES, the Contract Price shall be adjusted by a Change Order. The adjustment shall be the difference between the total actual costs and the amount included in the Bid, as an additional amount due to the CONTRACTOR or a credit to the CITY, as appropriate.

D. In addition to the potholes indicated on the Drawings, or directed by the ENGINEER, the CONTRACTOR may opt to do further potholing deemed necessary at no additional cost to the CITY.

E. Potholing operations shall conform to all applicable requirements as to sidewall slopes, sheeting and shoring, and all other excavation and trenching provisions specified herein.

F. Potholes shall be identified and protected in accordance with the Engineer's instructions, the California Manual on Uniform Traffic Control Devices (MUTCD) and Work Area Traffic Control Handbook (WATCH) Standards.

G. The CONTRACTOR'S proposed method of potholing and schedule for potholing shall be submitted to the ENGINEER for approval, at least thirty (30) days prior to the commencement of operation. Any utilities damaged during potholing shall

be immediately reported to the ENGINEER and INSPECTOR and repairs made immediately in accordance with the specifications.

H. A complete log of all potholes shall be kept by the CONTRACTOR, showing specific locations and dimensions of trenches. The log shall be verified by the INSPECTOR prior to the backfilling of the potholes. The verified log will be submitted to the ENGINEER and the INSPECTOR within two (2) working days after completion of potholing in each area. Payment for potholing utilities not shown or otherwise referenced on the drawings, or as directed by the ENGINEER will not be made unless these potholes are listed on the verified log.

I. The CONTRACTOR shall record the coordinates, elevations and dimensions of all utilities and improvements verified or discovered by potholing. The records shall be submitted to the ENGINEER within two (2) working days after the completion of potholing in each area. The records shall also include dates of the potholing operations and any additional discovered information or pertinent data.

J. Upon completion of potholing in each area, and after verification of the logs by the INSPECTOR, potholes shall be immediately backfilled and compacted in accordance with the specifications, or restored as directed by the ENGINEER.

END OF SECTION

SECTION 01740 DEMOBILIZATION

1.1 THE REQUIREMENT

A. General

Whether Demobilization is included as a Contract Bid Item in the Bid Proposal Form or specified as part of the lump sum in the Contract Documents, the cost of labor, equipment, materials and incidentals for doing all the work in demobilization (upon completion of all contract work and not directly attributable to any specific bid item) shall be included in the Contract Price Breakdown and progress payment estimate. If there is no demobilization bid item the CONTRACTOR shall submit to the INSPECTOR for approval the Contract Price Breakdown with the amount established for demobilization.

Demobilization shall include, but not be limited to, the following items, all as required for the proper performance and completion of the Work:

1. Moving off of the Jobsite all of CONTRACTOR'S plant and equipment as required.

2. Dismantling and removing all temporary buildings and other construction facilities.

3. Dismantling and removing all temporary construction power and wiring.

4. Removing all sanitary facilities from the work site.

5. Remove all waste, debris, and rubbish caused by construction operations within the work area, adjacent properties and public roads.

6. Materials and equipment shall be removed from the site as soon as they are no longer necessary. Before the final inspection, the site shall be cleared of equipment, unused materials and rubbish so as to present a satisfactory clean and neat appearance. All cleanup costs shall be included in the CONTRACTOR'S Bid.

7. Dismantling and removal of all temporary fencing.

8. Provide City with all required As-Built drawings.

9. All required Corner Records have been filed with the County and all copies provided to the City per Section 01722 Surveying.

10. All items noted within the final inspection ("Punchlist") have been completed to the satisfaction of the City.

11. All project photographs as required within Section 01322 Construction Progress Photography have been provided.

12. Notice of Completion (NOC) will not be filed until all work is complete per this Section 01740.

END OF SECTION

TECHNICAL SPECIFICATIONS

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SECTION 02222 PROTECTING EXISTING UNDERGROUND UTILITIES

PART 1 - GENERAL

A. Description

This section includes materials and procedures for protecting existing underground utilities.

B. Related Work Specified Elsewhere

1. General Conditions

PART 2 - MATERIALS

A. Replacement in Kind

Except as indicated below or as specifically authorized by the Owner's Representative, reconstruct utilities with new material of the same size, type, and quality as that removed.

B. Vitrified Clay Sewer Pipe and Couplings

For sewer pipe 8 inches in diameter or under, replacement shall consist of plain-end pipe conforming to ASTM C 700. Compression couplings shall conform to ASTM C 594, band seal couplings or equal. Use at least two lengths of pipe in crossing the trench section as shown on the details in the drawings.

PART 3 - EXECUTION

A. General

1. Replace in kind street improvements, such as curbs and gutters, barricades, traffic islands, signalization, fences, signs, etc., that are cut, removed, damaged, or otherwise disturbed by the construction.

2. Where utilities are parallel to or cross the construction but do not conflict with the permanent work to be constructed, follow the procedures given below and as indicated in the drawings. Notify the utility owner 48 hours in advance of the crossing construction and coordinate the construction schedule with the utility owner's requirements. For utility crossings not shown in the drawings, refer to the General Conditions and the instructions of the Owner's Representative for guidance.

3. Determine the true location and depth of utilities and service connections which may be affected by or affect the work. Determine the type, material, and condition of these utilities. In order to provide sufficient lead time to resolve unforeseen conflicts, order materials and take appropriate measures to ensure that there is no delay in work.

4. Expose utilities 1,300 feet in advance of the pipeline construction.

B. Procedures

1. Protect in Place: Protect utilities in place, unless abandoned, and maintain the utility in service, unless otherwise specified in the drawings or in the specifications.

2. Cut and Plug Ends: Cut abandoned utility lines and plug the ends. Plug storm drains and sewers with an 8-inch wall of brick and mortar. Cap waterlines with a cast-iron cap or install a 3-foot-long concrete plug. Dispose of the cut pipe as unsuitable material.

3. Remove and Reconstruct: Where so indicated in the drawings or as required by the Owner's Representative, remove the utility and, after passage, reconstruct it with new materials. Provide temporary service for the disconnected utility.

C. Compaction

1. Utilities Protected in Place: Backfill and compact under and around the utility so that no voids are left.

2. Utilities Reconstructed: Prior to replacement of the utility, backfill the trench and compact to an elevation 1 foot above the top of the ends of the utility. Excavate a cross trench of the proper width for the utility and lay, backfill, and compact.

3. Alternative Construction--Sand Slurry: Sand slurry consisting of one sack (94 pounds) of portland cement per cubic yard of sand and sufficient moisture for workability may be substituted for other backfill materials to aid in reducing compaction difficulties. Submit specific methods and procedures for the review of the Owner's Representative prior to construction.

4. The protection of the utility during construction.

D. Thrust Blocks on Waterlines

Note that restrained joints is the required method of controlling thrust restraint on this project except where shown on the plans or as approved otherwise by the City of Redlands.

1. The Contractor's attention is called to thrust blocks delineated in the drawings for waterlines throughout the project whose thrust is in the direction of the new excavation and, therefore, may be affected by the construction. These waterlines are

owned and operated by the Owner. Protect thrust blocks in place or shore to resist the thrust by a means approved by the Owner and reconstruct. If the thrust blocks are exposed or rendered to be ineffective in the opinion of the Owner's Representative, reconstruct them to bear against firm unexcavated or backfill material.

2. Provide firm support by backfilling that portion of the trench for a distance of 2 feet on each side of the thrust block to be reconstructed from the pipe bedding to the pavement subgrade, with either:

   a. Sand-cement slurry (94 pounds of cement per cubic yard).

   b. The native material compacted to a relative compaction of 95%.

3. Then excavate the backfill material for construction of the thrust block.

4. Test compaction of the backfill material before pouring any concrete thrust block. Use Class 560-C-3250 concrete for reconstruction.

E. Adjacent Parallel Utilities

1. The Contractor's attention is called to utilities throughout the project that are parallel to the proposed utility.

2. The position of these utilities is just outside the new construction. Protect these utilities from any disturbances and repair the lines and associated vaults and appurtenances if they are damaged in any way. All costs incurred for protection of these lines or any costs incurred due to the presence of the lines, whether or not they lie within the new construction, shall be borne in full by the Contractor.

END OF SECTION

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APPENDIX A
CHECKLIST OF LABOR LAW REQUIREMENTS

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CHECKLIST OF LABOR LAW REQUIREMENTS
TO REVIEW AT JOB CONFERENCE MEETINGS

Name (print) _____Date _____

Company _____Project _____

The Federal and State labor law requirements applicable to the contract are composed of, but not limited to, the following:

1. Payment of Prevailing Wage Rates

The contractor to whom the contract is awarded and its subcontractors hired for the public works project are required to pay not less than the specified general prevailing wage rates to all workers employed in the execution of the contract. The contractor is responsible for ascertaining and complying with all current general prevailing wage rates for crafts and any rate changes that occur during the life of the contract. Information on all prevailing wage rates and all rate changes are to be posted at the job site for all workers to view.

2. Apprentices

It is the duty of the contractor and subcontractors to employ registered apprentices on the public works project under Labor Code Section 1777.5.

3. Penalties

There are penalties required for contractor's/subcontractor's failure to pay prevailing wages and for failure to employ apprentices, including forfeitures and debarment under Labor Code Sections 1775; 1776; 1777.1; 1777.7 and 1813.

4. Certified Payroll Reports

Under Labor Code Section 1776, contractors and subcontractors are required to keep accurate payroll records showing the name, address, social security number and work classification of each employee and owner performing work; also the straight time and overtime hours worked each day and each week, the fringe benefits, and, the actual per diem wage paid to each owner, journey person, apprentice worker or other employee hired in connection with the public works project. Employee payroll records shall be certified and shall be made available for inspection at all reasonable hours at the principal office of the contractor/subcontractor, or shall be furnished to any employee, or his/her authorized representative on request, pursuant to Labor Code Section 1776. Each contractor and subcontractor shall submit its weekly certified payroll reports to the LCR from the agency no less than weekly or within ten days of request. In the event that there has been no work performed during a given week, the certified payroll report shall be annotated: "No work" for that week. Under Labor Code Section 1776(h) there are penalties required for contractor's/ subcontractor's failure to maintain and submit copies of certified payroll records on request. **For projects bidding after April 1, all contractors will need to upload their certified payroll to the Department of Labor Standards Enforcement website. Effective Jan. 1, 2016, ALL projects will require contractors to upload all certified payroll. This requirement is in addition to the request for payrolls by the City of Redlands;

5. Nondiscrimination in Employment

There exist prohibitions against employment discrimination under Labor Code Sections 1735 and 1777.6, the Government Code, the Public Contracts Code, and Title VII of the Civil Rights Act of 1964.

6. Kickbacks Prohibited

Contractors and subcontractors are prohibited from recapturing wages illegally or extracting "kickbacks" from employee wages under Labor Code Section 1778.

7. Acceptance of Fees Prohibited

There exists a prohibition against contractor/subcontractor acceptance of fees for registering any person for public work under Labor Code Section 1779; or for filling work orders on public works contracts pursuant to Labor Code Section 1780.

8. Listing of Subcontractors

All prime contractors are required to list properly all subcontractors hired to perform work on the public works projects covering more than one-half of one percent, pursuant to Government Code 4100 et seq.

9. Properly Licensed and Registered

Contractors are required to be licensed properly and to require that all subcontractors be properly licensed. Penalties are required for employing workers while unlicensed under Labor Code Section 1021 and under the California Contractor License Law found at Business and Professions Code Section 7000 et seq. Contractors and subcontractors are also required to be registered with the Division of Labor Standards Enforcement to work on public works projects in California. Requirements for registration and penalties for not being registered are found in Labor Code 1773.3.

10. Unfair Competition Prohibited

Contractors and subcontractors are prohibited from engaging in unfair competition as specified under Business and Professions Code Sections 17200 to 17208.

11. Workers Compensation Insurance

Labor Code 1861 requires contractors and subcontractors be insured properly for workers compensation.

12. OSHA

Contractors and subcontractors are required to abide by the Occupational, Safety and Health laws and regulations that apply to the particular construction project.

13. Undocumented Workers

Contractors and subcontractors are prohibited by the Federal government against hiring undocumented workers, and must secure proof of eligibility/citizenship from all workers.

14. Itemized Wage Statements

Contractors and subcontractors must provide itemized wage statements to employees per Labor Code 226.

In accordance with Federal and State laws and with the awarding agency contract documents, the undersigned prime contractor wishes to assure the City of Redlands that it intends to comply with the above-referenced labor law requirements, fully understanding that failure to comply with the above requirements may subject it to penalties as provided above.

Contractor	**City of Redlands**
_____	_____
Name Printed	Name Printed
_____	_____
Signature	Signature
_____	_____
Title	Title
_____	_____
Date	Date

IMPORTANT NOTICE

New Requirements for Contractors Working on California Public Works / Prevailing Wage Projects

Significant changes in prevailing wage law have recently been made that affect all contractors working on Public Works Projects within California. Please note the following important information:

CONTRACTOR REGISTRATION REQUIREMENT

By April 1, 2015, all contractors must be registered with the Division of Labor Standards Enforcement (DLSE) to work on public works projects in California.

WHO must register?
All contractors and subcontractors working on public works projects in California must be registered. This includes prime contractors, subcontractors and sole owner/operators- everyone performing labor on a public works project.

WHEN is registration required?
Contractors must be registered with the DLSE to bid on all public works projects that bid after March 1, 2015. All contractors working on public works projects must be registered by April 1, 2015. Registration is valid until June 30 of each year and may be renewed annually. Registrations are currently being accepted.

WHERE do I register?
Registration is done online at:
https://efiling.dir.ca.gov/PWCR/ActionServlet?action=displayPWCRegistrationForm

HOW MUCH is the fee?
Contractor registration fee is currently set at $300 but may increase each year. This fee shall be paid during the initial registration and each annual renewal.

DO I qualify for registration?
Contractors will need to meet minimum qualification standards to be registered. These include:

- Be properly licensed with the Contractors State License Board for your trade.
- Provide evidence of workers compensation insurance (if applicable).
- Be in good standing (Have no outstanding liabilities for wages, damages, penalties due to an employee or the State, may not be under State or Federal debarment).

WHAT happens if I don't register?
Unregistered contractors working on or bidding for public works projects will be subject to an immediate $2,000 fine and the $300 registration fee to continue working on the project. Unregistered contractors may be removed from the project by the Awarding Agency. Contractors found working on public works projects without being registered also risk not being approved for registration by DLSE.

ELECTRONIC CERTIFIED PAYROLL REPORTING REQUIREMENTS

Prevailing wage law has been changed to require contractors to submit certified payrolls electronically to the DLSE.

WHO is required to submit certified payrolls?
All contractors, subcontractors and sole owner/operators will be required to submit certified payrolls electronically to the DLSE.

WHEN do I need to submit certified payrolls electronically?
If your project is awarded after April 1, 2015, electronic payroll submission is required immediately. Otherwise, electronic payroll submission will be required for all projects awarded on or after January 1, 2016.

WHERE do I submit my certified payrolls?
For now, certified payrolls can be submitted by contractors to the DLSE at: https://apps.dir.ca.gov/ecpr/DAS/AltLogin This website address will change when the DLSE implements their online electronic database system which still has not been developed. Alliant will notify contractors when this system is available.

DO I still need to submit hard copy certified payrolls?
The City of Redlands will still require hard copy submission of certified payroll reports per your contract. The requirement to submit certified payrolls electronically to the DLSE does not replace the requirement for contractors to submit payrolls to the City of Redlands.

Contact the City of Redlands regarding any questions you may have regarding the new requirements for contractor registration or online submission of certified payroll: (909) 798-7698.

PUBLIC WORKS CONTRACT AWARD INFORMATION (DAS-140)

This is not a request for dispatch of apprentices.

Contract award information must be sent to your Apprenticeship Committee if you are approved to train. If you are not approved to train, you must send the information (which may be this form) to ALL applicable Apprenticeship Committees in your craft or trade in the area of the site of the public work. Go to: **http://www.dir.ca.gov/das/PublicWorksForms.htm** for information about programs in your area and trade. The information shall be provided to the applicable apprenticeship committee within ten (10) days of the date of the execution of the prime contract or subcontract, but in no event later than the first day in which the contractor has workers employed upon the public work.

Do not send this form to the Division of Apprenticeship Standards.

NAME OF YOUR COMPANY	CONTRACTORS STATE LICENSE NO.
MAILING ADDRESS-NUMBER & STREET, CITY, ZIP CODE	AREA CODE & TELEPHONE NO.
NAME AND ADDRESS OF PUBLIC WORKS PROJECT	DATE YOUR CONTRACT WAS EXECUTED
	DATE OF EXPECTED/ACTUAL START OF PROJECT
NAME & ADDRESS OF PUBLIC AGENCY AWARDING CONTRACT	ESTIMATED NUMBER OF JOURNEYMAN HOURS
	OCCUPATION OF APPRENTICE
THIS FORM IS BEING SENT TO: (NAME AND ADDRESS OF APPRENTICESHIP PROGRAM(S)	ESTIMATED NUMBER OF APPRENTICE HOURS
	APPROXIMATE/ACTUAL DATES TO BE EMPLOYED

This is not a request for dispatch of apprentices.

Contractors must make a separate request for actual dispatch, in accordance with Section 230.1(a) California Code of Regulations

Check One of the Boxes Below

1. ☐ We are already approved to train apprentices by the _____ Apprenticeship Committee. We will employ and train under their standards. (Enter name of Committee)

2. ☐ We will comply with the standards of _____ Apprenticeship Committee for the duration of this job only. (Enter name of Committee)

3. ☐ We will employ and train apprentices in accordance with the California Apprenticeship Council regulations, including § 230.1 (c) which requires that apprentices employed on public projects can only be assigned to perform work of the craft or trade to which the apprentice is registered and that the apprentices must at all times work with or under the direct supervision of journeyman/men.

_____
Signature Date

_____
Typed Name

_____
Title

DAS-140 FORM - PUBLIC WORKS CONTRACT AWARD INFORMATION

(Title 8, California Code of Regulations, Section 230)
(California Labor Code, Section 1777.5 (e))

SUBMIT CONTRACT AWARD INFORMATION

Prior to commencing work on a contract for Public Works **every** Contractor shall provide contract award information to the apprenticeship committee for each applicable apprenticeable craft or trade in the area of the site of the public works project that has approved the contractor to train apprentices. Contractors who are not already approved to train by an apprenticeship program sponsor shall provide contract award information to **all** of the applicable apprenticeship committees whose geographic area of operation includes the area of the public works project. This contract award information shall be in writing on a DAS Form 140, Public Works Contract Award Information or a letter which includes the following information:

(1) Contractor's name, address, telephone number and state license number;
(2) The full name and address of the public work awarding agency;
(3) The exact location of the public work site;
(4) Date of the contract award;
(5) Expected start date of the work;
(6) Estimated journeyman hours;
(7) Occupation of Apprentice;
(8) Approximate number of apprentices to be employed; and
(9) Approximate dates apprentices will be employed.

This information shall be provided to the applicable apprenticeship committee within ten (10) days of the date of the execution of the prime contract or subcontract, but in no event later than the first day in which the contractor has workers employed upon the public work.
Failure to provide contract award information, which is known by the awarded contractor, shall be deemed to be a continuing violation for the duration of the contract, ending when a Notice of Completion is filed by the Awarding Body, for the purpose of determining the accrual of penalties under Labor Code Section 1777.7.

THE TOP SECTION OF THE FORM COMPLETELY FILLED OUT will provide the information required pursuant to California Labor Code Section 1777.5 and California Code of Regulations Section 230.1.

LOWER SECTION OF THE FORM Check an appropriate box (#1, 2 or 3) for your status.

In addition to the "ORIGINAL(S)" mailed to all applicable Apprenticeship Committees, a copy of this information shall also be submitted to the City of Redlands.

NOTE: The filing of a DAS 140 is not a request for the dispatch of registered apprentices

CONTRACTOR FRINGE BENEFIT STATEMENT

Project Name:	**Project Location:**	**Today's Date:**
Contractor / Subcontractor Name:	**Business Address:**	

In order that the proper Fringe Benefit rates can be verified when checking payrolls on the above contract, the hourly rates for fringe benefits, subsistence and/or travel allowance payment made for employees by the employer on the various classes of work are tabulated below. **Please Include Apprentice Rates.**

Classification:		**Effective Date:**	**Subsistence or Travel Pay:** $_____
EMPLOYER PAID FRINGE BENEFITS	**Health & Welfare** $_____ hr	**Paid To:** **Name of Plan/Fund/Program:** **Address:**	_____ _____
	Pension $_____ hr	**Paid To:** **Name of Plan/Fund/Program:** **Address:**	_____ _____
	Vacation/Holiday $_____ hr	**Paid To:** **Name of Plan/Fund/Program:** **Address:**	_____ _____
	Training $_____ hr	**Paid To:** **Name of Plan/Fund/Program:** **Address:**	_____ _____
	Other $_____ hr	**Paid To:** **Name of Plan/Fund/Program:** **Address:**	_____ _____

Classification:		**Effective Date:**	**Subsistence or Travel Pay:** $_____
EMPLOYER PAID FRINGE BENEFITS	**Health & Welfare** $_____ hr	**Paid To:** **Name of Plan/Fund/Program:** **Address:**	_____ _____
	Pension $_____ hr	**Paid To:** **Name of Plan/Fund/Program:** **Address:**	_____ _____
	Vacation/Holiday $_____ hr	**Paid To:** **Name of Plan/Fund/Program:** **Address:**	_____ _____
	Training $_____ hr	**Paid To:** **Name of Plan/Fund/Program:** **Address:**	_____ _____
	Other $_____ hr	**Paid To:** **Name of Plan/Fund/Program:** **Address:**	_____ _____

Supplemental statements must be submitted during the progress of the work should there be an increase or change in rates. Use additional sheets as necessary. (Attach a copy of your most recent premium transmittal (including copy of check submitted) into each of the above plans/funds/programs or a letter from the above plans/funds/programs reflecting current payment status).

I certify under penalty of perjury that fringe benefits are paid to the approved plans, funds or programs as listed above.

Print Name and Title	**Signature and Date (Wet Signature Required)**

California
Department of
Industrial Relations

PUBLIC WORKS PAYROLL REPORTING FORM

Page _____ of _____

NAME OF CONTRACTOR:
OR SUBCONTRACTOR:

CONTRACTOR'S LICENSE NO.:
SPECIALITY LICENSE NO.:

ADDRESS:

PAYROLL NO.:

FOR WEEK ENDING:

SELF-INSURED CERTIFICATE NO.:

WORKERS' COMPENSATION POLICY NO.:

PROJECT OR CONTRACT NO.:

PROJECT AND LOCATION:

(1) NAME, ADDRESS AND SOCIAL SECURITY NUMBER OF EMPLOYEE	(2) NO. OF WITH-HOLDING EXEMPTIONS	(3) WORK CLASSIFICATION	(4) DAY	M	T	W	TH	F	S	S	(5) TOTAL HOURS	(6) HOURLY RATE OF PAY	(7) GROSS AMOUNT EARNED		(8) DEDUCTIONS, CONTRIBUTIONS AND PAYMENTS							(9) NET WGS PAID FOR WEEK	CHECK NO.
				DATE									THIS PROJECT	ALL PROJECTS	FED. TAX	FICA (SOC. SEC.)	STATE TAX	SDI	VAC/ HOLIDAY	HEALTH & WELF.	PENSION		
			S	HOURS WORKED EACH DAY																			
															TRAING.	FUND ADMIN	DUES	TRAV/ SUBS.	SAVINGS	OTHER*	TOTAL DEDUC-TIONS		
			O																				
													THIS PROJECT	ALL PROJECTS	FED. TAX	FICA (SOC. SEC.)	STATE TAX	SDI	VAC/ HOLIDAY	HEALTH & WELF.	PENSION		
			S																				
															TRAING.	FUND ADMIN	DUES	TRAV/ SUBS.	SAVINGS	OTHER*	TOTAL DEDUC-TIONS		
			O																				
													THIS PROJECT	ALL PROJECTS	FED. TAX	FICA (SOC. SEC.)	STATE TAX	SDI	VAC/ HOLIDAY	HEALTH & WELF.	PENSION		
			S																				
															TRAING.	FUND ADMIN	DUES	TRAV/ SUBS.	SAVINGS	OTHER*	TOTAL DEDUC-TIONS		
			O																				
													THIS PROJECT	ALL PROJECTS	FED. TAX	FICA (SOC. SEC.)	STATE TAX	SDI	VAC/ HOLIDAY	HEALTH & WELF.	PENSION		
			S																				
															TRAING.	FUND ADMIN	DUES	TRAV/ SUBS.	SAVINGS	OTHER*	TOTAL DEDUC-TIONS		
			O																				

S = STRAIGHT TIME
O = OVERTIME
SDI = STATE DISABILITY INSURANCE

*OTHER – Any other deductions, contributions and/or payments whether or not included or required by prevailing wage determinations must be separately listed. Use extra sheet(s) if necessary

CERTIFICATION **MUST** be completed
(See reverse side)

Form A-1-131 (New 2-80)

Statement of Compliance

Date:_____

I _____, the undersigned, am the _____ with the authority to act for and on
(Print Name) (Position in Business)
behalf of _____ certify under penalty of perjury that the records commencing on _____ and ending on _____ submitted herein and consisting of ____ pages are the originals, full and corrected documents, which depict the payroll record(s) of actual disbursements by way of cash, check, or whatever form to the individual or individuals names,

(1) That this employer has complied with the requirements of the California Labor Code Sections. 1771, 1811, and 1815 for all performed on this public works project, and that the classifications set forth therein for each trade rate conform with the work Performed.
(2) That any apprentices employed in the above period are duly registered to a bona fide apprenticeship program registered with the State of California's Division of Apprenticeship Standards.

PAYROLL/OTHER DEDUCTIONS

1. I herein certify the *full* and complete Prevailing Wages were paid as currently published and posted by the Director of Industrial Relations, State of California and only deductions as authorized under the laws of the State *of* California or the laws of United States of America have been made from these sums.
2. All other deductions are clearly listed for each employee on an attachment as required by the Director of Industrial Relations, State of California.

OPTIONAL BENEFIT PLANS

I herein certify that all employee deductions for benefit plans are authorized and the employee(s) are signed up for the plan(s) and are receiving the benefit(s) of the plan(s) listed.

☐ WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS
In addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above payroll, payment of fringe benefits as listed in the contract have or will be made to the appropriate programs for the benefit of such employees, except as noted below.

☐ WHERE FRINGE BENEFITS ARE PAID IN CASH
Each laborer or mechanic listed in the above payroll has been paid as indicated on the payroll, an amount not less the sum of the applicable basic hourly rate plus the amount of the required fringe benefits as listed in the determination for the craft, except as noted below,

Exception(s)

Craft	Explanation
Craft	Explanation
Craft	Explanation

Remarks

I herein certify under the penalty of perjury all of the above is true and correct as submitted.

Name **Signature**

Date **Payroll #**

CONTRACTOR INFORMATION SHEET

Job Name: _____ Category: _____

Prime Contractor: _____

Subcontractor: _____ License#: _____

Address: _____

Phone #: _____ Payroll Report Contact: _____

Email Address: _____

Fax #: _____ Contract Amount: _____

Estimated Start Date: _____ Estimated End Date: _____

ANTICIPATED TRADES/CLASSIFICATIONS:

_____ _____

_____ _____

_____ _____

SUB-CONTRACTORS (if applicable)

Name: License #: Phone/ Fax #: Contact:

_____

_____

_____

APPENDIX B
CITY OF REDLANDS
WORKDAY CONSTRUCTION SCHEDULE

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CITY OF REDLANDS

MUNICIPAL UTILITIES AND ENGINEERING DEPARTMENT

2025

APPENDIX B

CONSTRUCTION WORKDAY CALENDAR

JANUARY

S	M	T	W	T	F	S
			1 1	2 2	3 3	4 4
5 5	6 6	7 7	8 8	9 9	10 10	11 11
12 12	13 13	14 14	15 15	16 16	17 17	18 18
19 19	20 20	21 21	22 22	23 23	24 24	25 25
26 26	27 27	28 28	29 29	30 30	31 31	

FEBRUARY

S	M	T	W	T	F	S
						1 32
2 33	3 34	4 35	5 36	6 37	7 38	8 39
9 40	10 41	11 42	12 43	13 44	14 45	15 46
16 47	17 48	18 49	19 50	20 51	21 52	22 53
23 54	24 55	25 56	26 57	27 58	28 59	

MARCH

S	M	T	W	T	F	S
						1 60
2 61	3 62	4 63	5 64	6 65	7 66	8 67
9 67	10 69	11 70	12 71	13 72	14 73	15 74
16 75	17 76	18 77	19 78	20 79	21 80	22 81
23 82	24 83	25 84	26 85	27 86	28 87	29 88
30 89	31 90					

APRIL

S	M	T	W	T	F	S
		1 91	2 92	3 93	4 94	5 95
6 96	7 97	8 98	9 99	10 100	11 101	12 102
13 103	14 104	15 105	16 106	17 107	18 108	19 109
20 110	21 111	22 112	23 113	24 114	25 115	26 116
27 117	28 118	29 119	30 120			

MAY

S	M	T	W	T	F	S
				1 121	2 122	3 123
4 124	5 125	6 126	7 127	8 128	9 129	10 130
11 131	12 132	13 133	14 134	15 135	16 136	17 137
18 138	19 139	20 140	21 141	22 142	23 143	24 144
25 145	26 146	27 147	28 148	29 149	30 150	31 151

JUNE

S	M	T	W	T	F	S
1 152	2 153	3 154	4 155	5 156	6 157	7 158
8 159	9 160	10 161	11 162	12 163	13 164	14 165
15 166	16 167	17 168	18 169	19 170	20 171	21 172
22 173	23 174	24 175	25 176	26 177	27 178	28 179
29 180	30 181					

JULY

S	M	T	W	T	F	S
		1 182	2 183	3 184	4 185	5 186
6 187	7 188	8 189	9 190	10 191	11 192	12 193
13 194	14 195	15 196	16 197	17 198	18 199	19 200
20 201	21 202	22 203	23 204	24 205	25 206	26 207
27 208	28 209	29 210	30 211	31 212		

AUGUST

S	M	T	W	T	F	S
					1 213	2 214
3 215	4 216	5 217	6 218	7 219	8 220	9 221
10 222	11 223	12 224	13 225	14 226	15 227	16 228
17 229	18 230	19 231	20 232	21 233	22 234	23 235
24 236	25 237	26 238	27 239	28 240	29 241	30 242
31 243						

SEPTEMBER

S	M	T	W	T	F	S
	1 244	2 245	3 246	4 247	5 248	6 249
7 250	8 251	9 252	10 253	11 254	12 255	13 256
14 257	15 258	16 259	17 260	18 261	19 262	20 263
21 264	22 265	23 266	24 267	25 268	26 269	27 270
28 271	29 272	30 273				

OCTOBER

S	M	T	W	T	F	S
			1 274	2 275	3 276	4 277
5 278	6 279	7 280	8 281	9 282	10 283	11 284
12 285	13 286	14 287	15 288	16 289	17 290	18 291
19 292	20 293	21 294	22 295	23 296	24 297	25 298
26 299	27 300	28 301	29 302	30 303	31 304	

NOVEMBER

S	M	T	W	T	F	S
						1 305
2 306	3 307	4 308	5 309	6 310	7 311	8 312
9 313	10 314	11 315	12 316	13 317	14 318	15 319
16 320	17 321	18 322	19 323	20 324	21 325	22 326
23 327	24 328	25 329	26 330	27 331	28 332	29 333
30 334						

DECEMBER

S	M	T	W	T	F	S
	1 335	2 336	3 337	4 338	5 339	6 340
7 341	8 342	9 343	10 344	11 345	12 346	13 347
14 348	15 349	16 350	17 351	18 352	19 353	20 354
21 355	22 356	23 357	24 358	25 359	26 360	27 361
28 362	29 363	30 364	31 365			

City Holiday

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CITY OF REDLANDS

MUNICIPAL UTILITIES AND ENGINEERING DEPARTMENT

2026

APPENDIX B

CONSTRUCTION WORKDAY CALENDAR

JANUARY

S	M	T	W	T	F	S
				1 1	2 2	3 3
4 4	5 5	6 6	7 7	8 8	9 9	10 10
11 11	12 12	13 13	14 14	15 15	16 16	17 17
18 18	19 19	20 20	21 21	22 22	23 23	24 24
25 25	26 26	27 27	28 28	29 29	30 30	31 31

FEBRUARY

S	M	T	W	T	F	S
1 32	2 33	3 34	4 35	5 36	6 37	7 38
8 39	9 40	10 41	11 42	12 43	13 44	14 45
15 46	16 47	17 48	18 49	19 50	20 51	21 52
22 53	23 54	24 55	25 56	26 57	27 58	28 59

MARCH

S	M	T	W	T	F	S
1 60	2 61	3 62	4 63	5 64	6 65	7 66
8 67	9 68	10 69	11 70	12 71	13 72	14 73
15 74	16 75	17 76	18 77	19 78	20 79	21 80
22 81	23 82	24 83	25 84	26 85	27 86	28 87
29 88	30 89	31 90				

APRIL

S	M	T	W	T	F	S
			1 91	2 92	3 93	4 94
5 95	6 96	7 97	8 98	9 99	10 100	11 101
12 102	13 103	14 104	15 105	16 106	17 107	18 108
19 109	20 110	21 111	22 112	23 113	24 114	25 115
26 116	27 117	28 118	29 119	30 120		

MAY

S	M	T	W	T	F	S
					1 121	2 122
3 123	4 124	5 125	6 126	7 127	8 128	9 129
10 130	11 131	12 132	13 133	14 134	15 135	16 136
17 137	18 138	19 139	20 140	21 141	22 142	23 143
24 144	25 145	26 146	27 147	28 148	29 149	30 150
31 151						

JUNE

S	M	T	W	T	F	S
	1 152	2 153	3 154	4 155	5 156	6 157
7 158	8 159	9 160	10 161	11 162	12 163	13 164
14 165	15 166	16 167	17 168	18 169	19 170	20 171
21 172	22 173	23 174	24 175	25 176	26 177	27 178
28 179	29 180	30 181				

JULY

S	M	T	W	T	F	S
			1 182	2 183	3 184	4 185
5 186	6 187	7 188	8 189	9 190	10 191	11 192
12 193	13 194	14 195	15 196	16 197	17 198	18 199
19 200	20 201	21 202	22 203	23 204	24 205	25 206
26 207	27 208	28 209	29 210	30 211	31 212	

AUGUST

S	M	T	W	T	F	S
						1 213
2 214	3 215	4 216	5 217	6 218	7 219	8 220
9 221	10 222	11 223	12 224	13 225	14 226	15 227
16 228	17 229	18 230	19 231	20 232	21 233	22 234
23 235	24 236	25 237	26 238	27 239	28 240	29 241
30 242	31 243					

SEPTEMBER

S	M	T	W	T	F	S
		1 244	2 245	3 246	4 247	5 248
6 249	7 250	8 251	9 252	10 253	11 254	12 255
13 256	14 257	15 258	16 259	17 260	18 261	19 262
20 263	21 264	22 265	23 266	24 267	25 268	26 269
27 270	28 271	29 272	30 273			

OCTOBER

S	M	T	W	T	F	S
				1 274	2 275	3 276
4 277	5 278	6 279	7 280	8 281	9 282	10 283
11 284	12 285	13 286	14 287	15 288	16 289	17 290
18 291	19 292	20 293	21 294	22 295	23 296	24 297
25 298	26 299	27 300	28 301	29 302	30 303	31 304

NOVEMBER

S	M	T	W	T	F	S
1 305	2 306	3 307	4 308	5 309	6 310	7 311
8 312	9 313	10 314	11 315	12 316	13 317	14 318
15 319	16 320	17 321	18 322	19 323	20 324	21 325
22 326	23 327	24 328	25 329	26 330	27 331	28 332
29 333	30 334					

DECEMBER

S	M	T	W	T	F	S
		1 335	2 336	3 337	4 338	5 339
6 340	7 341	8 342	9 343	10 344	11 345	12 346
13 347	14 348	15 349	16 350	17 351	18 352	19 353
20 354	21 355	22 356	23 357	24 358	25 359	26 360
27 361	28 362	29 363	30 364	31 365		

City Holiday

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APPENDIX C
PERMITS

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Application for Road / Encroachment Permit

City of Redlands - Municipal Utilities & Engineering Department

Name: _____ Phone: _____

Address: _____ City: _____ Zip: _____

Contractor: _____ USA ID No.: _____

Contractor License No.: _____ Type: _____ Cal OSHA No.: _____

I hereby request permission to construct/install improvements/facilities within the City of Redlands road right-of-way at the following location:

Construction Start Date: _____ Anticipated Completion Date: _____

Development No.: _____ Plan No.: _____

Street Name: _____

Cross Streets: _____

Address: _____

and for the purpose of performing the following work:

_____

_____

Applicant/Agent Signature: _____ Date: _____

In accordance with Plans approved by the Municipal Utilities & Engineering Director and/or the Standard Specifications and Detail Drawings of the City of Redlands for the **quantity and type** of improvements listed below:

SHADED AREA FOR OFFICIAL USE ONLY

_____	EA	Driveway Appr, Res/Comm	$ 49.00	/ EA	=$	_____
_____	SF	Sidewalk	$ 0.09	/ SF	=$	_____
_____	SF	Cross Gutter/Spandrel	$ 0.58	/ SF	=$	_____
_____	LF	Curb & Gutter	$ 2.19	/ LF	=$	_____
_____	LF	Curb/Berm	$ 2.62	/ LF	=$	_____
_____	SF	Asphalt Pavement	$ 0.04	/ SF	=$	_____
_____	SF	Crushed Aggregate Base	$ 0.04	/ SF	=$	_____
_____	EA	Street Light	$ 81.00	/ EA	=$	_____
_____	EA	Traffic Signal - New	$ 2,152.00	/ EA	=$	_____
_____	EA	Traffic Signal - Modification	$ 1,737.00	/ EA	=$	_____
_____	CY	Reinforced Concrete	$ 89.00	/ CY	=$	_____
_____	LF	Storm Drain Pipe	$ 8.00	/ LF	=$	_____
_____	EA	Curb Inlet/Outlet Structures	$ 67.00	/ EA	=$	_____
_____	EA	Storm Drain Manhole/Junction Box	$ 67.00	/ EA	=$	_____
_____	EA	Curb Core	$ 62.00	/ EA	=$	_____
_____	LF	Sewer Main	$ 0.95	/ LF	=$	_____
_____	EA	Sewer Manhole	$ 67.00	/ EA	=$	_____
_____	EA	Sewer Cleanout	$ 134.00	/ EA	=$	_____
_____	EA	Sewer Lateral	$ 67.00	/ EA	=$	_____
_____	LF	Water Main - Potable	$ 1.09	/ LF	=$	_____
_____	LF	Water Main - Non-Potable	$ 1.09	/ LF	=$	_____
_____	EA	Fire Hydrant Assembly	$ 66.00	/ EA	=$	_____
_____	EA	Water Service Lateral	$ 26.00	/ EA	=$	_____
_____	EA	Water Shutdown	$ 67.00	/ EA	=$	_____
_____	EA	Fire Service	$ 58.00	/ EA	=$	_____
_____	LF	Excavation/Utility Trench	$ 1.25	/ LF	=$	_____
_____	SF	Street Patch	$ 0.67	/ SF	=$	_____
_____	SF	Warranty Fee (Street Cut)	$ _____	/ SF	=$	_____
_____		_____	$ _____	/	=$	_____
_____		_____	$ _____	/	=$	_____

SUBTOTAL PERMIT FEE $ _____

PERMIT FEE — work complete within specified date from issuance = $ 219.00 fee. **$219.00**

PENALTY FEE 25% of total permit fee if issued after commencement of work ($250.00 minimum fee) $ _____

(Effective 06/02/09) **TOTAL ENCROACHMENT PERMIT FEE** $ _____

Truck Route Permit Required: ☐ YES ☐ NO

Closure Permit With Traffic Plan Required: ☐ YES ☐ NO

Water Shutdown Required: ☐ YES ☐ NO

Bond Required: ☐ YES ☐ NO

Conduit Material: _____

Conduit Size: _____

Calculated By
Inspected by
Municipal Utilities & Engineering
Approved By

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APPENDIX D
CONTRACTOR SAFETY PROGRAM

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CONTRACTOR SAFETY PROGRAM

Rev. July 2024

TABLE OF CONTENTS

I. POLICY 3

II. AUTHORITY 3

III. SCOPE 3

IV. DEFINITIONS 3

V. RESPONSIBILITIES 4

RISK MANAGEMENT 4
PROJECT MANAGER (CITY) 5
INSPECTOR (CITY) 5
EMPLOYEES (CITY) 5
CONTRACTOR 5
PROJECT SAFETY OFFICIAL 6

VI. PROGRAM 6

SAFETY PREQUALIFICATION QUESTIONNAIRE 6
APPEAL PROCESS 7
CONSTRUCTION PROJECTS (TIER I AND TIER II) 8
INSPECTIONS 9
TRAINING/DOCUMENTATION 9
NON-COMPLIANCE 9
CITY PERSONNEL 9

VII. RECORDKEEPING 10

VIII. ADDITIONAL REFERENCES 10

ACKNOWLEDGMENT OF RECEIPT (A) 11
SAFETY PREQUALIFICATION QUESTIONNAIRE (B) 12
NOTICE OF NONCOMPLIANCE (C) 13
JOB HAZARD ANALYSIS (D) 14
INCIDENT INVESTIGATION FORM (E) 15

I. Policy

The purpose of this Contractor Safety Program ("CSP") is to ensure, as best as reasonably possible, the protection and safety of all persons and property during construction activities undertaken by private contractors on behalf of the City of Redlands ("City"). The City has a comprehensive and structured approach in outsourcing services performed on City facilities by third-party persons and entities ("Contractor(s)"). The first phase of this comprehensive approach includes actively screening Contractors based on safety records, safety performance, and safety compliance. After the qualified Contractor is awarded a contract, the Contractor must then ensure compliance with all local, state, federal and Cal/OSHA regulations applicable to the contracted scope of work, and requirements set forth within this CSP. The Contractor, its agents, and personnel must adhere to the policies and procedures set forth by this CSP and all applicable laws and regulations.

II. Authority

California Code of Regulations, Title 8, Section 336.10 "Determination of Citable Employer"
California Code of Regulations, Title 8
"Greenbook" Standard Specifications for Public Works Construction
Redlands Municipal Code
California Building Code

III. Scope

This CSP applies to all Contractors who provide or render construction or improvement services for City-owned property and facilities.

The Contractor services covered under this CSP include, but are not limited to, the following:

A. New construction;
B. Remodeling;
C. Facility maintenance or repair;
D. Equipment installation or maintenance; and
E. Services (i.e. janitorial, fleet operations, landscaping, etc.)

Consultants/ Professional service providers are exempt from having to submit a Safety Prequalification Questionnaire ("SPQ"), prior to the beginning of work, but they are expected to be compliant with industry best practices with regards to maintaining a safe work environment for their employees and others.

IV. Definitions

A. **Contract –** any written agreement between the City of Redlands and a Contractor, to perform a specified scope of work on City facilities. With respect to this policy, a contract includes, but is not limited to: awarded purchase orders, bids, and/ or project contracts.
B. **Construction Work –** construction, alteration, and/or repair, including painting and decorating.
C. **Contractor –** a person or entity (including all personnel) awarded a contract to perform work on City property or facilities.
D. **D.A.R.T Rate –** Injuries and illnesses severe enough to warrant: Days Away, Restrictions and Transfers. The DART rate is calculated using the following formula: Number of OSHA Recordable injuries and illnesses that resulted in Days Away x 200,000/divided by total hours worked by all employees during the year covered.

E. **Designated Work Area –** an area where it is necessary to restrict or limit entry or access of nonessential personnel or the public. Examples include work areas involving remediation abatement, demolition, excavation, and overheadlifting.
F. **Facilities –** any building or property owned by the City of Redlands.
G. **Hazard –** source or situation with a potential for harm in terms of injury or health, damage to property, damage to workplace environment, or a combination ofthese.
H. **Job Hazard Analysis ("JHA") –** a technique that focuses on job tasks as a way to identify hazards before they occur. It focuses on the relationship between the worker, the task, the tools, and the work environment. The objective is to eliminate the risk or to utilize control measures to reduce the risk.
I. **North American Industry Classification System ("NAICS") –** is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. businesseconomy.
J. **Non-compliance –** any deviation from standards, practices, processes, procedures, regulations etc. that could either directly or indirectly lead to injury or illness, property damage, damage to the workplace environment, or any combination of thesecriteria.
K. **Notice of non-compliance –** form provided to the Contractor by the City alerting the contractor of non-compliance with City specifications, Cal/OSHA regulations, or any other generally accepted safe work practice.
L. **Non-compliant hazardous work condition –** any hazard that is considered to be non-compliant with State or Federal safety and health regulations, City specifications, or any inconsistency with generally accepted work practices.
M. **Personnel –** all Contractor employees, contractors, sub-contractors and agents providedaccess to City property or facilities.
N. **Recordable Incident** – any injury or illness resulting in death, days away from work, restricted work or transfer to another job, medical treatment beyond first aid, or loss of consciousness per OSHA Section 1904.7(a).
O. **Safety Tailgate –** informal safety meeting generally conducted at the job site prior to the commencement of a job or work shift.
P. **Services –** any and all, labor, duties, functions and activities required to be performed by the Contractor under the contract and any subsequent addenda.

V. Responsibilities

RISK MANAGEMENT

A. Update, maintain, and administer this CSP;
B. Maintain centralized records of training, site visit data, written programs, tailgate meetings, permits, and all other necessary contractor related documentation;
C. Provide technical assistance to Engineering personnel;
D. Attend Pre-construction meetings and progress meetings asneeded;
E. Provide assistance on safety inspections as needed;
F. Review safety submittals;
G. Provide guidance on pre-qualification determination; and
H. Provide training to affected city personnel with responsibilities under thisprogram.

PROJECT MANAGER (CITY)

The Project Manager has the authority to delegate any or all portions of this CSP to subordinates, but the Project Manager will be held accountable for their compliance. The Project Manager shall contact Risk Management, as necessary, for assistance in relation to this CSP.

A. Ensure safety hazards are addressed in a timely manner;
B. Communicate safety concerns during pre-construction meetings and progress meetings;
C. Inform impacted employees of construction activities scheduled in their work area;
D. Enforce pre-qualification procedures in bidding process; and
E. Ensure this CSP is properly executed.

INSPECTOR (CITY)

The City of Redlands construction inspector is not a safety professional and will only provide "Notice of Non-Compliance" for obvious and serious non-compliant conditions.

A. To the best of their abilities, inspect work sites for safety hazards;
B. Communicate safety concerns to Contractor;
C. Provide Contractor with "Notice of Non-Compliance" when serious conditions occur or repeat violations;
D. Collect documentation needed for construction worksites;
E. Submit documentation to Risk Management for recordkeeping;
F. Maintain photo documentation of safety hazards;
G. Never enter situations that can harm or endanger himself/herself;
H. Never use personal protective equipment (PPE) or enter situations, which they are not trained for;
I. Contact Emergency Medical Services (911) and Risk Management in case of emergency; and
J. Attend and communicate safety concerns in progress meetings.

EMPLOYEES (CITY)

A. Immediately notify the Project Manager, inspector, or Risk Management of any safety related concerns at a Contractor job site; and
B. Contact Emergency Medical Services (911) and Risk Management in case of emergency.

CONTRACTOR

Where relevant and applicable, the Contractor's responsibilities shall include:

A. Compliance with requirements and responsibilities detailed within the Contractor Safety Program;
B. Ensure all local regulatory requirements are met and all necessary permits are obtained before conducting work on behalf of the City;
C. Designate a Project Safety Official by name who shall always be available to abate safety hazards;
D. Ensure all personnel have the appropriate qualifications and training to perform the contracted work (Copies of current training documentation and certifications must be on file with the City);
E. Inform City Project Manager or inspector of any job site safety hazards or concerns;
F. Inform City Project Manager if any suspected asbestos-containing material is located;
G. Conduct and submit Job Hazard Analysis (JHA) before work and as required by change of tasks;
H. Conduct and submit Safety Tailgates on a bi-weekly basis;
I. Provide all required PPE necessary to conduct work safely and in accordance with required local regulations;
J. The safety of all individuals who enter work site;
K. Spill cleanup;
L. Immediately report any incidents, accidents, near misses, unsafe conditions, or unsafe acts involving any jobsite personnel;

M. Arrange for the proper storage and removal of waste generated prior to the completion of job, and provide confirmation that the materials have been removed or disposed of in a manner compliant with all applicable environmental regulations;
N. Removing all equipment used during work activities and ensuring proper housekeeping of designated work area at the end of each workday and upon completion of the job;
O. Contact Emergency Services (911) and Project Manager in the event of an emergency; and
P. For the actions of their subcontractors, as they may pertain to this CSP, including their adherence to its contents and review of this document.

PROJECT SAFETY OFFICIAL (CONTRACTOR)

A. Shall always be at the work site;
B. Must be thoroughly familiar with the Contractor's Injury and Illness Prevention Program (IIPP) and Code of Safe Practices;
C. Shall always be available to abate any potential safety hazards; and
D. Shall have the authority and responsibility to shut down an unsafe operation, if necessary.

VI. Program

SAFETY PREQUALIFICATION PROCESS

A. The safety prequalification process is intended to:
   - Provide the City with knowledge of past and current safety performance of Contractors working on City construction projects;
   - Improve Contractor compliance with City safety rules, including safe work practices required by applicable regulations and laws; and
   - Improve safety during Contractor activities.
B. A copy of the SPQ shall be provided to each person or entity bidding on a project, as part of the bidding process.
C. The completed questionnaire shall be returned and reviewed prior to awarding contract work, with supporting information provided as indicated by responses on the questionnaire.
D. The SPQ shall be submitted to 35 Cajon St., Suite 4
   Redlands Ca, 92373
   Attention: Project Name-Contractor Name-SPQ
E. The following criteria and information relating to the Contractor will be reviewed prior to awarding contract:
   - Contractor License;
   - Incident Rates;
   - OSHA Citations;
   - Safety Policies;
   - Safety Programs and Procedures;
   - Compliance History on City Projects; and
   - Certification Statement.
F. Contractor must qualify in each section to be approved for the award of a contract.
G. If a Contractor fails to pass prequalification procedure, the City has the right to disqualify the Contractor's proposal.

H. All costs associated with compliance with City of Redlands prequalification requirements shall be at the sole expense of the Contractor.

I. If a Contractor provides information that is later determined to be false, or improperly withholds information, the Contractor will be immediately disqualified.

J. Any questions or information relating to filing this questionnaire may be answered by reaching:
   - Engineering: (909) 798-7698; or
   - Risk Management: (909) 798-7514

DISQUALIFICATION APPEAL PROCESS

This provision is established pursuant to Public Contract Code section 20101(d) which requires every public agency that requires prospective bidders to prequalify pursuant to the law to establish "a process that will allow prospective bidders to dispute their proposed prequalification rating prior to selection of an alternate bidder." If the City intends to disqualify a bidder based upon the bidder's safety record, the City will notify the bidder in writing and provide the bidder with any supporting evidence that has been received from others or adduced because of an investigation by the City. The notice of intention shall be sent by certified mail with return receipt requested or by overnight mail via a delivery service that provides online tracking which identifies the date of the prospective bidder's receipt of the notice, and shall include notice that the bidder has the right to, and may request a hearing to rebut any evidence used as a basis for disqualification and to present evidence to the City as to why the prospective bidder should be found qualified. Requests for a hearing must be made by written request to the City within ten calendar days of the date of the prospective bidder's receipt of the City's notice of intention. If the bidder does not request a hearing within the time allowed, the City's determination shall stand unchallenged and become final.

Within seven calendar days of receiving the bidder's request for a hearing, the City shall notify the bidder in writing of the date, time and place of the hearing. The hearing shall be held no sooner than ten (10) calendar days and no later than fifteen (15) calendar days after the notice is given. The notice shall inform the bidder of its right to present testimony and documents in support of its position.

The hearing shall be conducted before the Redlands City Manager, which may be continued from time to time as reasonably determined by the City Manager but shall not exceed forty five (45) days. At the conclusion of the hearing, and after considering all testimony and documentation presented, the City Manager shall issue a written decision no later than five calendar days following the hearing. The City Manager's decision shall be final and is not subject to further appeal to the City.

The bidder shall not be entitled to bid on any contracts with the City until it has met the safety pre-qualification standards. If the City Manager approves an appeal, the contractor will have been deemed to meet the qualification standards and it will be valid for one year. The bidder shall have the right to withdraw its application for prequalification or its appeal at any time before the City Manager's decision becomes final. Such withdrawal will not preclude the bidder from re-applying for prequalification.

CONSTRUCTION PROJECTS

A. After a contract is awarded, the Contractor shall maintain, throughout the duration of the project, safety measures as necessary to protect the public and workers within, or in the vicinity of, the designated work zone. This includes an evaluation of the work to be performed and the hazards likely to be encountered. Contractors are expected to follow, at a minimum, all pertinent laws, rules, and regulations for the location in which they will be working. Where applicable, Contractor Safety Programs will meet or exceed City programs/ procedures and are subject to review and approval by the City prior to contract execution.

B. Job Hazard Analysis ("JHA")
    1. Prior to a notice to proceed a JHA must be completed utilizing the City's form, or equivalent, to assess the hazards present in the designated work area. Any information requested on the City's form, but not stated on the equivalent form utilized, shall be provided separately with the original submission.
    2. All members of the construction unit must sign the JHA to acknowledge hazard abatement procedures.
    3. JHA must be kept at job site accessible to all impacted personnel.
    4. Failure to follow JHA procedures may lead to termination of the contract.
C. Personal Protective Equipment ("PPE")
    1. All required PPE must be always worn during work activities.
    2. All mandatory PPE must be highlighted in the JHA.
    3. The Contractor shall provide PPE.
    4. Failure to follow PPE guidelines may lead to termination of the contract.
D. Safety Tailgates
    1. Safety Tailgate Meetings must be held on a biweekly basis for all construction projects.
    2. The first meeting shall take place on Day 1, Week 1 and every other week thereafter.
    3. Tailgates shall be signed by all personnel and submitted to Construction Inspector for recordkeeping.
    4. Tailgate topics should be specific to the scope of work of the project.
E. Injury Reporting
    1. Contractors shall immediately report injuries or accidents to the Project Manager (regardless of severity). Additionally, contractors are responsible for and must also conduct accident investigations of any injuries that occur on site and provide results to the Project Manager.
    2. Use the City Incident Investigation Form (Attachment E), or equivalent, to meet this requirement.
F. Spill Prevention
    1. The Contractor is responsible for any spill within the confines of the project and those outside of the construction limits caused by the Contractor's defective equipment, containers, or personnel.
    2. Secondary spill containment systems shall be used to prevent contamination of the environment.
G. Construction in Occupied Buildings
    1. When building occupants are present during construction projects additional safeguards must be implemented to eliminate exposures and complaints. Dust/ particulates from demolition, sanding and other construction activities must be controlled by adequate ventilation, or containment and negative air ventilation systems based upon the specific type of activity and particle. Similar controls must be utilized for odorous activities including, but not limited to, carpet adhesive, painting, welding, and coatings.
    2. The Contractor shall ensure that the HVAC system is protected to prevent contamination. If an HVAC system is unprotected and contaminated by any construction/demolition materials, the Contractor shall be held responsible for the cost of cleaning the system and any subsequent repairs therein.
    3. Negative air ventilation systems shall have appropriate filtration and be exhausted outside of the building.

INSPECTIONS

A. Follow-up inspections will be executed to enforce compliance with safety and health requirements.
B. Follow-up inspections will be conducted as part of routine site inspections by construction inspector and Risk Management employees.

C. The SPQ aims to provide the City with knowledge of Contractor safety history and safety practices. This minimizes the need for an increased frequency of inspections. In addition, the City will take the following guidelines into consideration when determining the frequency of inspections.
    1. Scale of project;
    2. The frequency with which the number and types of hazards change as the work progresses;
    3. More frequent inspections will be implemented in the beginning of the project; and
    4. When the Contractor has never worked for the City.

TRAINING/DOCUMENTATION

A. The contractor will ensure that all personnel are trained for the scope of work they are assigned, as well as the equipment they will be utilizing.
B. Documentation shall be on file with the City prior to project start.
C. Personnel missing training documentation shall not be permitted to work on awarded City projects.
D. Training requirements are mandated by Federal and State Regulations. This may include, but is not limited to, the programs listed in the SPQ.

NON-COMPLIANCE

A. Contractor compliance issues shall be documented on the "Notice of Non-Compliance" form. A copy of this form shall be provided to the Contractor for completion.
B. Upon receipt of the completed "Notice of Non-Compliance" form, the Project Manager and Risk Management will evaluate, based on the incident, and identify, as appropriate, any additional corrective and/or preventive actions for completion.
C. If immediate correction is not feasible, the project will be temporarily stopped until the issue is adequately resolved.
D. City staff with authority to stop work are:
    1. Construction Inspector;
    2. City Project Manager;
    3. City Manager; and
    4. Risk Management staff.
E. Any violation or deviation from safety rules, procedures, or regulations, based on evaluation, may be subject to all disciplinary actions listed as follows:
    1. Verbal warning
    2. Written warning-Notice of Non-Compliance (work may not continue until approved corrections are implemented);
    3. Dismissal of non-complying personnel; and/or
    4. Termination of Contract.

The City of Redlands maintains the right to terminate any contract for the violation of safety issues without liability to the City.

CITY PERSONNEL

A. All affected City employees will be informed in advance of any construction related work or other contract work which has the potential for impacting their workplace. Notifications will be made to all affected employees via e-mail or written memo by the Project Manager or designee. Notifications must include the following information:
    1. Start and end dates of the work to be completed;
    2. Work areas to be affected;

3. Description of work to be completed;
4. Name and phone number of Project Manager;
5. Name and phone number of Construction Inspector; and
6. Name and phone number of Risk Management.

B. Employees should be instructed to notify the Project Manager regarding logistical issues or other concerns. Safety and Health concerns should be directed to either the Project Manager, Inspector, or Safety Specialist.

VII. Recordkeeping

The City's Human Resources / Risk Management Department will maintain all records prepared in association with this CSP, with copies also place on file with the office of the City Clerk.

VIII. Additional References

https://www.dir.ca.gov/title8/336_10.html

City of Redlands
Acknowledgment of Receipt Statement

I acknowledge by signing this document, that I have received and reviewed the City of Redlands' Contractor Safety Program and understand that it contains valuable information on the City's policies and procedures regarding employee safety as it pertains to Contractor activities. Furthermore, I acknowledge that failure to comply with any of these procedures may lead to termination of the contract with the City.

Contractor Signature	Contractor Title:
Contractor Name (Print)	Date Signed

If you have any questions regarding this document, please contact the Risk Management Division at (909) 798-7514.

CITY OF REDLANDS
SAFETY PREQUALIFICATION QUESTIONNAIRE

Omitting or reporting false information on this questionnaire may result in disqualification of bid. The City of Redlands reserves the right to conduct random or for-cause audits of information stated in this questionnaire. If deemed necessary, additional documentation may be requested by the City to verify responses on this questionnaire.

SECTION 1 – GENERAL INFORMATION

Company Name:	
Contractor License #:	Expiration Date:
Address:	
City:	State: Zip Code:
Name of Person Submitting Application:	
Title:	Telephone #:
Email Address:	
Identify the highest-ranking Safety/Health Professional in your Company:	
Name:	
Title:	Telephone #:

SECTION 2 – INCIDENT RATES & WORKER'S COMPENSATION INFORMATION

INCIDENT RATES Provide your actual injury and illness data below:	Provide the NAICS Code Number that best represents your Firm:_____ Provide any additional numbers here:_____

(Provide three full years of data)	Last Calendar	2 Years Ago	3 Years Ago
Number of hours worked by all employees:			
Total Recordable Incident Rate*:			
D.A.R.T. Rate*:			
Total Number of Fatalities:			

Incident Rate = [(Total Recordable Cases X 200,000 hours)/ Number of hours worked by all employees]

D.A.R.T. Rate = [(Total Number of entries for Days Away, Restricted and Job Transfer X 200,000 hours)/ Number of hours worked by all employees]

If your latest incident rates and D.A.R.T. rates are greater than 100% of the industry average for all your NAICS code Numbers Listed, your bid may be disqualified.

The industry average can be found at www.bls.gov

WORKERS' COMPENSATION INFORMATION

1. Provide your Workers' Compensation Experience Modification Rate (EMR) Data:

	Policy Year	EMR
Current EMR*		
1 Year Ago:		
2 Years Ago:		
3 Years Ago:		

* If your current EMR is greater than 1.25, initialing here certifies that you will provide a competent, full- time person or representative responsible for safety for all City projects:_____

* Initialing here certifies that your firm does not have an EMR:_____
(Submit a copy of your firm's Loss Run Reports for the last three years if your firm does not have an EMR.)

Name of your firm's Workers' Compensation carrier:

Phone Number of Workers' Compensation carrier

2. Is your firm self-insured for Workers' Compensation claims?	Yes ❒	No ❒
If yes, please attach a copy of the latest Annual Report to the State of California Department of Industrial Relations and/or State of California Certificate of Self-Insurance.)		

SECTION 3– CITATION HISTORY

1. Has your firm received any regulatory citations in the last threeyears?	Yes ❒	No ❒
If yes, please answer the question below.		

2. Were any of the confirmed (Closed) citations classified as Serious, Willful, Repeat, or Failure to abate?	Yes ❒	No ❒
3. If yes, please explain:		
4. Have you abated all the citations issued to you in the last three years	Yes ❒	No ❒
If no, please explain abatement action plan:		

SECTION 4 – SAFETY POLICIES

	Questions (Please check YES or NO)	YES	NO*
1.	Does your company provide and adhere to a written Illness Prevention Program (IIPP) (CCR Title 8 §3203(a))? If yes, a copy of the program will be required on-hand at the job site throughout the duration of the contract. Please attach a copy to your bid proposal.	☐	☐
2.	Does your company provide and conduct Tailgate Meetings or equivalent with employees at least every 10 working days? (CCR Title 8 §1509(e))	☐	☐
3.	Does your company have a policy for disciplinary action for unsafe behavior ensuring employee compliance with safe and healthy work practices? (CCR Title 8 §3203(a)(2))	☐	☐
4.	Does your company provide and abide by a written Code of Safe Practices that relates to your firm's operations. (CCR Title 8 §1509(b)) If yes, a copy of the Code of Safe Practices will be required on-hand at the job site throughout the duration of the contract. Please attach a copy with your bid proposal.	☐	☐
5.	Does your company perform JHAs? (CCR Title 8 §1511(b)	☐	☐
6.	Does your company provide training and retraining programs for ensuring employee compliance with safe and healthy work practices? (CCR Title 8 §3203 (a)(2), (a)(7)	☐	☐
7.	Does your company provide training and retraining programs for ensuring employee compliance	☐	☐

*Please provide reason(s) for NO answer in the box below or on a separate sheet of paper.

Failure to provide the above-referenced documents will result in the contractor's bid being disqualified.

SECTION 5 – SAFETY PROGRAMS AND PROCEDURES

PLEASE ANSWER ALL QUESTIONS BY CHECKING YES OR NO, AND ATTACHING APPROPRIATE DOCUMENTS THAT MAY APPLY OR AS REQUESTED.

		YES	NO
1.	**Is Confined Space work anticipated in the scope of the work awarded? (If no, please proceed to Question 2)**	☐	☐
	If yes, please attach the following:	Attached?	
	Copy of written Confined Space Entry Procedure	☐	☐
	List of personnel authorized on jobsite to work in confined space(s)	☐	☐
	List of personnel authorized on jobsite to serve as Rescue Team	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐
2.	**Is work requiring Lockout/Tagout protocols anticipated in the scope of the work awarded? (If no, please proceed to Question 3)**	☐	☐
	If yes, please attach the following:	Attached?	
	Copy of written Lockout/Tagout (LOTO) Procedure	☐	☐
	List of personnel authorized on jobsite to perform LOTO	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐
3.	**Is work requiring a personal lift anticipated in the scope of the work awarded? (If no, please proceed to Question 4)**	☐	☐
	If yes, please attach the following:	Attached?	
	List of personnel authorized on jobsite to use lifts	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐
4.	**Is work requiring a forklift anticipated in the scope of the work awarded? (If no, please proceed to Question 5)**	☐	☐
	If yes, please attach the following:	Attached?	
	List of personnel authorized on jobsite to use a forklift	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐
5.	**Is work requiring a crane anticipated in the scope of the work awarded? (If no, please proceed to Question 6)**	☐	☐
	If yes, please attach the following:	Attached?	
	Copy of written Crane Program	☐	☐
	Copy of all expected Crane operators' Certifications	☐	☐
	List of personnel designated as Competent under Crane program	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

NOTE: If awarded bid, more documentation may be required

6.	**Is Hot Work (as defined by OSHA) anticipated in the scope of the work awarded? (If no, please proceed to Question 7)**	☐	☐
	If yes, please attach the following:	Attached?	
	Copy of written Hot Work Procedure	☐	☐
	List of personnel authorized on jobsite to perform Hot Work	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

7.	**Is Trenching/ Excavation work anticipated in the scope of the work awarded? (If no, proceed to Question 8)**	☐	☐
	Is a plan in place for the disposal of all material that cannot be returned to the trench/ excavation?	☐	☐
	Are appropriate materials for barricading or securing work area at jobsite?	☐	☐
	Has a permit from the Department of Industrial Relations for excavations deeper than 5 feet been obtained?	☐	☐
	If yes, please attach the following:	Attached?	
	Copy of written Trenching/ Excavation Procedure	☐	☐
	Copy of Permit if trench is to exceed depth of 5 feet	☐	☐
	List of personnel designated as Competent under Trenching/ Excavation Program	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

NOTE: If awarded bid, more documentation may be required

8.	**Is electrical work anticipated in the scope of the work awarded? (If no, proceed to Question 9)**	☐	☐
	If yes, please attach the following:	Attached?	
	Copy of written Electrical Safety Program	☐	☐
	List of personnel designated as Competent under Electrical Safety Program	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

9.	**Is work that may have an arc flash potential anticipated in the scope of the work awarded? (If no, proceed to Question 10)**	☐	☐
	Are all materials required to safely perform arc flash present?	☐	☐
	If yes, please attach the following:	Attached?	
	Copy of Arc Flash Procedure	☐	☐
	List of personnel designated as Competent under Arc Flash Program	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

10.	**Is work involving chemicals anticipated in the scope of the work awarded? (If no, proceed to Question 11)?**	☐	☐
	If yes, please attach the following:	Attached?	
	Copy of written Hearing Conservation Program	☐	☐
	List of personnel working in high noise areas	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

11.	**Is work involving chemicals anticipated in the scope of the work awarded? (If no, proceed to Question 12)?**	☐	☐
	* Copies of SDS for Chemicals used must be kept at jobsite		
	Please attach the following:	Attached?	
	Copy of written Hazard Communication Program	☐	☐
	List of personnel performing work with chemicals	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐
	List trade names of all hazardous materials which you will be using on site:		

12.	**Is work on or adjacent to public roadways anticipated in the scope of the work awarded? (If no, proceed to Question 13)**	☐	☐
	Do you have the appropriate provisions (signs, devices, barricades/)	☐	☐
	Please attach the following:	Attached?	
	Please provide a list of personnel working in traffic areas.	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

NOTE: If awarded bid, more documentation may be required

13.	**Is it anticipated in the scope of the work awarded that exposure to asbestos is possible? (If no, proceed to Question 14)**	☐	☐
	Please attach the following:	Attached?	
	Copy of written procedure(s)	☐	☐
	List of personnel working with potential exposure to asbestos	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

14.	**Is it anticipated in the scope of the work awarded that exposure to silica is possible? (i.e. sandblasting, concrete demolition, concrete saw cutting, surface grinding, etc.) (If no, proceed to Question 15)**	☐	☐
	Please attach the following:	Attached?	
	Copy of Silica Control Plan	☐	☐
	List of personnel working with potential exposure to silica	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

15.	**Is work at heights anticipated in the scope of the work awarded? (If no, proceed to Question 16)**	☐	☐
	Please attach the following:	Attached?	
	Copy of written Fall Protection Program	☐	☐
	List of personnel designated as Competent under Fall Protection Program	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

16.	**Is work requiring the use of respirators anticipated in the scope of the work awarded? (If no, proceed to Question 17)**	☐	☐
	Please attach the following:	Attached?	
	Copy of written Respiratory Protection Program	☐	☐
	List of personnel using respirators	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

17.	**If the scope of work to be performed is not adequately represented by questions (1-16), please list any additional Health & Safety concerns below.**

SECTION 6 – COMPLIANCE HISTORY ON CITY PROJECTS

In addition to the previous sections, Contractors that have previously been awarded work by the City, will be equally evaluated on their compliance history in relation to City projects.

SECTION 7 – CERTIFICATION STATEMENT

I Certify under penalty of perjury that:

a. the information contained herein is true and correct to the best of my knowledge, and

b. no attempt has been made to give false or misleading information or to withhold any information.

Signature of Authorized Representative:	Title of Authorized Representative
Printed Name of Authorized Representative	Date Signed:

NOTICE OF NON-COMPLIANCE

Project: _____

Contractor: _____

Notice of Non-Compliance was issued to Contractor's representative, _____,
Name

on _____ at _____.

The following unsafe behaviors were observed at the Contractor's job site:

_____
_____
_____
_____
_____
_____
_____

If the unsafe condition is not immediately corrected, the City of Redlands may take disciplinary action in accordance with the Contractor Safety Program guidelines.

_ _

To be completed by Contractor

Corrective action plan to abate hazards:

_____
_____
_____
_____
_____
_____

Unsafe Condition Resolved: Date: _____ Time: _____

Remarks:

_____
_____
_____
_____
_____
_____

Job Hazard Analysis

Project:			
Company:	Project Safety Official:	Project Manager (City):	
Scope of Work:		Location:	Date:

Tasks	Potential Safety Risks/Hazards	Safety Controls/Mitigate	Required PPE
			☐ Hard Hat ☐ Safety Vest ☐ Safety Glasses/Goggles ☐ Safety Boots ☐ Respirator ☐ Safety Gloves ☐ Face Shield ☐ Fall Protection ☐ Other: _____ _____ _____ _____

Signatures of Employees On-Site this JHA is applicable to:

Employee Signature:	**Print Name:**	**Date:**

INCIDENT INVESTIGATION FORM

Date of Incident:	Time of Incident:	Date Reported:
Lead Investigator:	Contact Information:	
Contractor:	Employee Name:	
Witness 1 Name:	Telephone:	
Witness 2 Name:	Telephone:	
Incident Site/ Location		
Incident Summary:		
Near Miss Yes No	Incident Severity: Minor Significant Major Critical	
Root Cause(s):		
Corrective Actions:		

City Council Meeting **J. 4.**

DATE: 10/21/2025

TO: Honorable Mayor and City Council Members

SUBJECT: Consideration of a Public Works Construction Contract with Elegant Construction, Inc. for the Joint Utilities Laboratory Building Renovation and Expansion Project for an amount not-to-exceed $3,097,000, and determination that this action is exempt from environmental review pursuant to Section 15301(e)(1) of the State's guidelines implementing the California Environmental Quality Act (Municipal Utilities and Engineering Director Harris)

MOTION(S):

If City Council determines the staff recommendation is appropriate, the following motions are provided:

1. I move that City Council determine approval of a Public Works Construction Contract with Elegant Construction, Inc. is exempt from environmental review pursuant to Section 15301(e)(1) of the State's guidelines implementing the California Environmental Quality Act; and

2. I move that the City Council approve the Joint Utilities Laboratory Building Renovation and Expansion Project plans and specifications, and award a Public Works Construction Contract to Elegant Construction, Inc. for an amount not-to-exceed $3,097,000.

RECOMMENDATION:

Staff recommends City Council determine approval of a Public Works Construction Contract with Elegant Construction, Inc. is exempt from environmental review pursuant to Section 15301(e)(1) of the State's guidelines implementing the California Environmental Quality Act. Staff further recommends approval of the Joint Utilities Laboratory Building Renovation and Expansion Project plans and specifications, and award a Public Works Construction Contract to Elegant Construction, Inc. for an amount not-to-exceed $3,097,000.

DISCUSSION:

The Joint Utilities Laboratory (JUL) is an Environmental Laboratory Accreditation Program (ELAP) certified facility that samples, tests, and analyzes the City's water, wastewater, and biosolids to ensure compliance with regulatory standards and to maintain public health and safety. Since its original construction in 1988, the JUL facility has not been significantly upgraded or expanded, despite an increase in regulatory agency-mandated testing.

On June 18, 2024, City Council approved a Professional Services Agreement with CDM Smith, Inc. (CDM Smith) for the Joint Utilities Laboratory Building Renovation & Expansion Project (JUL Project). CDM Smith has completed the final design of the JUL Project. The JUL Project will complete the improvement in two (2) phases. Phase 1 includes the expansion of the JUL building footprint by approximately 1,990 SF. MUED staff and CDM Smith developed a scope of services for the construction plan of phase 1.

MUED staff advertised the Phase 1 construction and received the following eleven (11) bids on September 9, 2025:

BID OPENING REPORT SUMMARY	
BIDDER	**TOTAL BID AMOUNT**
1. Elegant Construction, Inc., Irvine, CA	$3,097,000
2. Lumar Corporation, Los Angeles, CA	$3,352,000
3. Newman Midland Corp., Long Beach, CA	* $3,390,575
4. SPEC Construction, Ontario, CA	$3,464,000
5. Caliba, Inc., Anaheim, CA	* $3,641,633
6. Cal-City Construction, Inc., Cerritos, CA	* $3,699,700
7. Caltec Corp., Irvine, CA	$3,730,000
8. Faris Construction Company, Oceanside, CA	$3,885,000
9. MLC Constructors, Inc., Corona, CA	$4,200,183
10. Kemcorp Construction, Inc., Ontario, CA	$4,535,000
11. Plyco Corp., Jurupa Valley, CA	* $4,748,866

*An arithmetic error was discovered in the bid proposal. The total bid amount was corrected and highlighted in the attached bid analysis to identify arithmetic errors. However, it did affect the ranking shown on the City clerk's bid opening report.

MUED staff reviewed each bid and determined that Elegant Construction, Inc. is the lowest responsive and responsible bidder. Therefore, staff recommends City Council approval of a Public Works Construction Contract with Elegant Construction, Inc. for an amount not-to-exceed $3,097,000. If approved, it is anticipated that the project will be completed within two hundred seventy (270)

working days after a Notice to Proceed is issued.

The Project is categorically exempt under Section 15301(e)(1) Class 1 existing facilities, which consist of the operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, involving negligible or no expansion of existing or former use. The proposed project includes the addition of 1,990 square feet of new structure to the existing 5,800 square feet of laboratory building. This addition is less than 50 percent of the existing structure's floor area, and less than 2,500 square feet. Therefore, the Project is categorically exempt in accordance with Section 15301(e)(1).

ALTERNATIVES:

City Council may deny the staff recommendation and provide alternate direction.

STRATEGIC PLAN:

N/A

SUBMITTED BY:
John R. Harris, Municipal Utilities and Engineering Director

RECOMMENDED BY:
Charles M. Duggan Jr., City Manager

REVIEWED BY:
Yvette M. Abich Garcia, City Attorney
Danielle Garcia, Management Services/Finance Director
Wilfresha Adweya, Laboratory Manager

PREPARED BY:
Goutam K. Dobey, City Engineer

Fiscal Impact

Fiscal Year:	FY 25/26
Appropriation Required Y/N:	N
Budgeted Y/N:	Y
Account No.:	501910 & 521910
Discussion:	

There is no fiscal impact associated with this action. Sufficient funding for this project is included in the Fiscal Year 25/26 Water Projects (501910) and Wastewater Projects (521910) Budget.

Attachments

A. Elegant Public Work Contract
B. Bid Opening Report
C. Bid Analysis
D. Project Plans
E. Project Specifications

PUBLIC WORK CONSTRUCTION CONTRACT

This Public Work Construction contract ("Contract") is made and entered into this 21st day of October, 2025, by and between the City of Redlands, a municipal corporation, organized and existing under the laws of the State of California (hereinafter "City"), and Elegant Construction, Inc. (hereinafter "Contractor"). City and Contractor are sometimes individually referred to herein as a "Party" and, together, as the "Parties."

In consideration of the mutual promises contained herein, City and Contractor agree as follows:

1. **SCOPE OF WORK:** Contractor shall furnish all materials and will perform all of the work for the following: Joint Utilities Laboratory Building Renovation & Expansion Project, complete all items as required by the Contract Documents (as herein defined) and Specifications for City's Joint Utilities Laboratory Building Renovation & Expansion Project, Project No. 521028 (the "Work").

2. **CONTRACT SUM:** City shall pay Contractor the sum of three million ninety-seven thousand dollars ($3,097,000) as consideration for its performance of the Work in accordance with the terms and conditions set forth in the Contract Documents. Pursuant to Public Contract Code Section 22300, Contractor has the option to deposit securities with an escrow agent as a substitute for retention of earnings required to be withheld by City pursuant to an escrow agreement as set forth in Public Contract Code section 22300.

3. **TIME FOR COMPLETION:** The Work shall be completed within two hundred seventy (270) working day(s) as defined in Section 1-2 of the Standard Specifications for Public Works Construction "Greenbook" from and after the date of City's issuance of a Notice to Proceed to Contractor.

4. **LIQUIDATED DAMAGES:** Contractor's failure to complete the Work within the time allowed will result in damages being sustained by City. Such damages are, and will continue to be, impracticable and extremely difficult to determine. Accordingly, Contractor shall pay to City, or have withheld from monies due to Contractor, the sum of five hundred dollars ($500) for each working day as defined in Section 1-2 of the Standard Specifications for Public Works Construction "Greenbook" in excess of the specified time for completion of the Work. Execution of this Contract shall constitute agreement by City and Contractor that five hundred dollars ($500) per day is the estimated damage to City caused by the failure of Contractor to complete the work within the allowed time. Such sum is liquidated damages and shall not be construed as a penalty, and may be deducted from payments due Contractor if such delay occurs.

5. **CONTRACT DOCUMENTS:** This Contract incorporates by reference the following: Notice Inviting Bids, Instructions to Bidders, Contractor's Proposal, Bid Bond, Agreement, Performance Bond, Labor and Material Bond, Plans, General Conditions, Special Provisions and Specifications, and any addenda thereto (collectively, the "Contract Documents").

6. **ATTORNEYS' FEES:** In the event any action is commenced to enforce or interpret the terms or conditions of this Contract, or the Contract Documents, the prevailing Party in such action, in addition to any costs and other relief, shall be entitled to recover its reasonable attorneys' fees, including fees for use of in-house counsel by a Party.

7. **RESOLUTION OF CONSTRUCTION CLAIMS:** Claims by Contractor in the amount of three hundred seventy five thousand dollars ($375,000) or less shall be made by Contractor and

processed by the City pursuant to the provisions of Part 3, Chapter 1, Article 1.5 of the Public Contract Code (commencing with Section 20104). All claims shall be in writing and include the documents necessary to substantiate the claim. Nothing in subdivision (a) of Public Contract Code Section 20104.2 shall extend the time limit or supersede the notice requirements provided in this case from filing claims by Contractor.

8. **ELIGIBILITY OF CONTRACTOR/SUBCONTRACTOR:** Contractor and all of its subcontractors shall abide by California Public Contract Code, Section 6109, and California Labor Code Sections 1777.1 and/or 1777.7, and certify that they are not debarred and are eligible to work on this project.

9. **ASSIGNMENT OF AGREEMENT:** No assignment by a Party of any rights or interests under this Contract shall be binding on another Party without the written consent of the Party sought to be bound.

10. **SUCCESSORS AND ASSIGNS:** City and Contractor each binds itself and their respective successors and assigns in respect to all covenants, agreements, and obligations contained in the Contract Documents.

11. **SEVERABILITY:** Any provision or part of the Contract Documents held to be void or unenforceable under any law or regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon City and Contractor.

IN WITNESS WHEREOF, the Parties hereto have executed this Contract the day and year first written above.

CITY OF REDLANDS

(SEAL)

By:_____
Mario Saucedo, Mayor

ATTEST:

_____
Jeanne Donaldson, City Clerk

(SEAL)

Elegant Construction, Inc._____
Name of Contractor

By:_____
Signature of Authorized Agent

_____
Title

_____
Signature of Authorized Agent (if necessary)

_____
Title

_____
Contractor's License No.

WORKER'S COMPENSATION INSURANCE CERTIFICATION

Description of Contract: City of Redlands
Municipal Utilities and Engineering Department
Joint Utilities Laboratory Building Renovation & Expansion Project
Project No. 521028

Every employer, except the State, shall secure the payment of compensation in one or more of the following ways:

a. By being insured against liability to pay compensation by one or more insurers duly authorized to write compensation insurance in this State.
b. By securing from the Director of Industrial Relations, a certificate of consent to self-insure, either as an individual employer, or as one employer in a group of employers, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his or her employees.

CHECK ONE

_____I am aware of the provisions of Section 3700 of the Labor Code which requires every employer to be insured against liability for Workers' Compensation or to undertake self-insurance in accordance with the provisions of that Code, and I will comply with such provisions before commencing the performance of the work and activities required or permitted under this Agreement. (Labor Code §1861).

_____I affirm that at all times, in performing the work and activities required or permitted under this Agreement, I shall not employ any person in any manner such that I become subject to the workers' compensation laws of California. However, at any time, if I employ any person such that I become subject to the workers' compensation laws of California, immediately I shall provide the City with a certificate of consent to self-insure, or a certification of workers' compensation insurance.

I certify under penalty of perjury under the laws of the State of California that the information and representations made in this certificate are true and correct.

Dated this _____ day of _____, 2025.

Elegant Construction, Inc._____
(Contractor)

_____
(Signature)

_____
(Official Title)

(SEAL)

(Labor Code Section 1861 provides that the above certificate must be signed and filed by the Contractor with the Owner prior to performing the work of the contract.)

FAITHFUL PERFORMANCE BOND

Whereas, the City of Redlands ("City"), State of California, and Elegant Construction, Inc. (hereinafter designated as "Principal") have entered into an agreement dated October 21, 2025 ("Agreement") whereby Principal agrees to install and complete certain public improvements (the "Work"), which said Agreement is identified as Joint Utilities Laboratory Building Renovation & Expansion Project and is hereby referred to and made a part hereof; and

Whereas, said Principal is required under the terms of the Agreement to furnish a bond for the faithful performance of the Work, now, therefore, we, the Principal and, _____, as Surety, are held and firmly bound unto the City in the penal sum of three million ninety-seven thousand dollars ($3,097,000) lawful money of the United States, for the payment of which sum we bind ourselves, and our heirs, successors, executors and administrators, jointly and severally, firmly by these presents.

The condition of this obligation is such that if the above bounded Principal, his or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and provisions in the Agreement and any alteration thereof made as therein provided, on his or its part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall faithfully fulfill the one-year guarantee of all materials and workmanship, and shall defend, indemnify and save harmless the City and its elected officials, officers, agents and employees, as therein stipulated, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect.

As a part of the obligation secured hereby and in addition to the face amount specified therefor, there shall be included costs and reasonable expenses and fees, including reasonable attorneys' fees, incurred by the City in successfully enforcing such obligations, all to be taxed as costs and included in the judgment rendered.

As a condition precedent to the satisfactory completion of the Work, the above obligation shall hold good for a period of one (1) year or longer if required by the Agreement after the acceptance of the work by the City, during which time if the Principal shall fail to make full, complete, and satisfactory repair and replacements and totally protect the City from loss or damage made evident during this period from the date of completion of the Work, and resulting from or caused by defective materials or faulty workmanship, the above obligation in penal sum thereof shall remain in full force and effect. The obligations of Surety hereunder shall continue so long as any obligation of the Principal remains.

Whenever the Principal shall be, and is declared by the City to be, in default under the Agreement, the City having performed the City obligations thereunder, the Surety shall promptly remedy the default, or shall promptly, at the City's option:

1. Complete the Work in accordance with its terms and conditions; or

2. Obtain a bid or bids for completing the Work in accordance with its terms and conditions, and upon determination by Surety of the lowest responsive and responsible bidder, arrange for a contract between such bidder and the City, and make available as work progresses sufficient funds to pay the cost of completion of the Work less the balance of the Agreement price, but not exceeding, including other costs and damages for which Surety may be liable hereunder, the amount set forth above. The term "balance of the Agreement price," as used in this paragraph, shall

mean the total amount payable to the Principal by the City under the Agreement and any modifications thereto, less the amount previously properly paid by the City to the Principal.

Surety expressly agrees that the City may reject any contractor or subcontractor which may be proposed by Surety in fulfillment of its obligations in the event of default by the Principal.

Surety shall not utilize the Principal in completing the Work nor shall Surety accept a bid from the Principal for completion of the Work if the City, when declaring the Principal in default, notifies Surety of the City's objection to the Principal's further participation in the completion of the Work.

No right of action shall accrue on the bond to or for the use of any person or corporation other than the City named herein or the successors or assigns of the City. Any suit under this bond must be instituted within the applicable statute of limitations period.

The said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Agreement or to the work to be performed thereunder or the Specifications accompanying the same shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Agreement or to the work or to the specifications.

No final settlement between the City and the Principal shall abridge the right of any beneficiary hereunder whose claim may be unsatisfied.

The Principal and Surety agree that if the City is required to engage the services of any attorney in connection with the enforcement of this bond, each shall pay the City's reasonable attorneys' fees incurred, with or without suit, in addition to the above sum.

In witness whereof, this instrument has been duly executed by the Principal and Surety above named, on _____, 2025.

(SEAL)	(SEAL)
_____	_____
(Contractor)	(Surety)
_____	BY: _____
(Signature)	(Signature)
	Address:_____
	_____
(Seal and Notarial Acknowledgment of Surety)	Telephone ( )_____

LABOR AND MATERIAL BOND

Whereas, the City Council of the City of Redlands, State of California, and Elegant Construction, Inc. (hereinafter designated as "Principal") have entered into an agreement (the "Agreement") whereby Principal agrees to install and complete certain designated public improvements (the "Work"), which said agreement, dated October 21, 2025, and identified as Joint Utilities Laboratory Building Renovation & Expansion Project is hereby referred to and made a part hereof; and

Whereas, under the terms of the Agreement, Principal is required before commencing the performance of the Work, to file a good and sufficient Labor and Material bond with the City of Redlands to secure the claims to which reference is made in Title 3 (commencing with Section 9550) of Part 6 of Division 4 of the Civil Code of the State of California.

Now, therefore, said Principal and the undersigned as corporate surety, are held firmly bound unto the City and all contractors, subcontractors, laborers, material men and other persons employed in the performance of the Agreement and referred to in the aforesaid Code of Civil Procedure in the sum of three million ninety-seven thousand dollars ($3,097,000) for materials furnished or labor thereon of any kind, or for amounts due under the Unemployment Insurance Act with respect to such work or labor, that said surety will pay the same in an amount not exceeding the amount hereinabove set forth, and also in case suit is brought upon this bond, will pay, in addition to the face amount thereof, costs and reasonable expenses and fees, including reasonable attorneys' fees, incurred by the City in successfully enforcing such obligation, to be awarded and fixed by the court, and to be taxed as costs and to be included in the judgment therein rendered.

It is hereby expressly stipulated and agreed that this bond shall insure to the benefit of any and all persons, companies and corporations entitled to file claims under Title 3 (commencing with Section 9550) of Part 6 of Division 4 of the Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond.

Should the condition of this bond be fully performed, then this obligation shall become null and void, otherwise it shall be and remain in full force and effect.

The surety hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Agreement or the specifications accompanying the same shall in any manner affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition.

In witness whereof, this instrument has been duly executed by the Principal and surety above named, on _____, 2025.

(SEAL)

_____

(Contractor)

_____

(Signature)

(Seal and Notarial Acknowledgement of Surety)

(SEAL)

_____

(Surety)

BY: _____

(Signature)

Address:_____

_____

Telephone: ( )_____

CITY OF REDLANDS
OFFICE OF THE CITY CLERK
BID OPENING REPORT

The following bid was opened on the **9th day of September 2025 at 2:00 p.m.** on behalf of the Municipal Utilities and Engineering Department for **Joint Utilities Laboratory Building Renovation and Expansion Project. Project No. 521028.** The bid amounts have not been checked and are subject to correction after the bids have been completely reviewed.

No.	Plan Holder's Name	Bid Certification Signed	Bid Bond Included	Addenda Issued (3)	Total Bid Amount
1	Elegant Construction, Inc., Irvine, CA	Yes	Yes	Yes	$3,097,000.00
2	Caliba, Inc., Anaheim, CA	Yes	Yes	Yes	$3,280,733.00
3	Lumar Corporation, Los Angeles, CA	Yes	Yes	Yes	$3,352,000.00
4	Newman Midland Corp., Long Beach, CA	Yes	Yes	Yes	$3,390,576.00
5	SPEC Construction, Ontario, CA	Yes	Yes	Yes	$3,464,000.00
6	Cal-City Construction, Cerritos, CA	Yes	Yes	Yes	$3,699,625.00
7	Caltec Corp, Irvine, CA	Yes	Yes	Yes	$3,730,000.00
8	Faris Construction Company, Oceanside, CA	Yes	Yes	No	$3,885,000.00
9	MLC Constructors, Inc., Corona, CA	Yes	Yes	Yes	$4,200,183.00
10	Kemcorp Construction, Inc., Ontario, CA	Yes	Yes	Yes	$4,535,000.00
11	Plyco Corp., Jurupa Valley, C	Yes	Yes	Yes	$4,748,865.00

Jeanne Donaldson, City Clerk
City of Redlands, California

Emailed: Councilmembers,
City Manager, PIO, Press
Department Head: John Harris
Staff: Goutam Dobey

CITY OF REDLANDS
MUNICIPAL UTILITIES & ENGINEERING DEPARTMENT
BID ANALYSIS

PROJECT NO. 521028 BID DATE: 9-Sep-2025

Joint Utilities Laboratory Building Renovation & Expansion Project EST. START DATE: 27-Oct-2025

Item No.	Bid Item	Quantity	Unit	Elegant Construction, Inc.		LuMar Corporation		Newman Midland Corp.	
				Unit Price	Item Price	Unit Price	Item Price	Unit Price	Item Price
1	Mobilization (Maximum 5% of total bid price)	1	LS	$50,000	$50,000	$150,000	$150,000	$150,000	$150,000
2	Site Demolition	1	LS	$100,000	$100,000	$90,000	$90,000	$42,131	$42,131
3	Removal of all trash and debris, shrubs, bushes, and pavement	1	LS	$50,000	$50,000	$80,000	$80,000	$45,504	$45,504
4	Civil Site Work	1	LS	$200,000	$200,000	$80,000	$80,000	$328,031	$328,031
5	Reroofing of Existing Building Work	1	LS	$200,000	$200,000	$70,000	$70,000	$292,348	$292,348
6	Concrete Work	1	LS	$200,000	$200,000	$150,000	$150,000	$164,920	$164,920
7	Structural Work	1	LS	$200,000	$200,000	$300,000	$300,000	$289,445	$289,445
8	CMU Walls and Masonry Work	1	LS	$200,000	$200,000	$350,000	$350,000	$173,042	$173,042
9	Architectural Work	1	LS	$100,000	$100,000	$732,000	$732,000	$489,401	$489,401
10	HVAC Work	1	LS	$200,000	$200,000	$260,000	$260,000	$217,365	$217,365
11	Plumbing Work	1	LS	$100,000	$100,000	$80,000	$80,000	$60,956	$60,956
12	Electrical Work	1	LS	$867,000	$867,000	$450,000	$450,000	$687,834	$687,834
13	Fire Protection Systems (Including Fire Alarm and Sprinklers)	1	LS	$250,000	$250,000	$150,000	$150,000	$48,378	$48,378
14	Demobilization	1	LS	$25,000	$25,000	$20,000	$20,000	$6,116	$6,116
15	Remaining Work Not Specifically Listed	1	LS	$5,000	$5,000	$50,000	$50,000	$15,779	$15,779
16	Contingency: Unforeseen work not covered within all other bid items	1	LS	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000
17	Construct Trash Enclosure	1	LS	$50,000	$50,000	$40,000	$40,000	$79,325	$79,325
	Last Minute Additions/Deductions								
	Total Bid Price				**$3,097,000**		**$3,352,000**		**$3,390,575**

The addition error corrected on the total bid price.

License Status	Active	Active	Active
Sub's License Status	Active	Active	Active
Bid Bond Company	Gray Casualty & Surety	Great MidWest Insurance	United Fire & Casualty Co
Submitted Entire Bid Package	Yes	Yes	Yes
Submitted Sub's Qualification Statement	Yes	No	No
DIR Status	Active	Active	Active
Error in Bid	No	No	Yes

CITY OF REDLANDS
MUNICIPAL UTILITIES & ENGINEERING DEPARTMENT
BID ANALYSIS

PROJECT NO. 521028 BID DATE: 9-Sep-2025

Joint Utilities Laboratory Building Renovation & Expansion Project EST. START DATE: 27-Oct-2025

Item No.	Bid Item	Quantity	Unit	Spec Construction Co. Inc.		CALIBA, Inc.		Cal-City Construction, Inc.	
				Unit Price	Item Price	Unit Price	Item Price	Unit Price	Item Price
1	Mobilization (Maximum 5% of total bid price)	1	LS	$75,000	$75,000	$466,700	$466,700	$134,200	$134,200
2	Site Demolition	1	LS	$150,000	$150,000	$82,080	$82,080	$89,000	$89,000
3	Removal of all trash and debris, shrubs, bushes, and pavement	1	LS	$25,000	$25,000	$17,670	$17,670	$33,600	$33,600
4	Civil Site Work	1	LS	$50,000	$50,000	$133,380	$133,380	$438,400	$438,400
5	Reroofing of Existing Building Work	1	LS	$175,000	$175,000	$257,640	$257,640	$435,000	$435,000
6	Concrete Work	1	LS	$350,000	$350,000	$250,800	$250,800	$277,300	$277,300
7	Structural Work	1	LS	$550,000	$550,000	$233,700	$233,700	$245,400	$245,400
8	CMU Walls and Masonry Work	1	LS	$200,000	$200,000	$199,500	$199,500	$180,800	$180,800
9	Architectural Work	1	LS	$225,000	$225,000	$393,300	$393,300	$555,700	$555,700
10	HVAC Work	1	LS	$300,000	$300,000	$210,900	$210,900	$238,500	$238,500
11	Plumbing Work	1	LS	$285,000	$285,000	$70,680	$70,680	$83,200	$83,200
12	Electrical Work	1	LS	$650,000	$650,000	$219,963	$219,963	$555,700	$555,700
13	Fire Protection Systems (Including Fire Alarm and Sprinklers)	1	LS	$50,000	$50,000	$88,920	$88,920	$145,000	$145,000
14	Demobilization	1	LS	$25,000	$25,000	$28,500	$28,500	$40,300	$40,300
15	Remaining Work Not Specifically Listed	1	LS	$25,000	$25,000	$248,520	$248,520	$63,100	$63,100
16	Contingency: Unforeseen work not covered within all other bid items	1	LS	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000
17	Construct Trash Enclosure	1	LS	$29,000	$29,000	$19,380	$19,380	$80,500	$80,500
	Last Minute Additions/Deductions						$420,000		($196,000)
	Total Bid Price				**$3,464,000**		**$3,641,633**		**$3,699,700**
						The addition error corrected on the total bid price.		The addition error corrected on the total bid price.	

License Status	Active	Active	Active
Sub's License Status	Active	Active	Active
Bid Bond Company	Old Republic Surety Co.	Employers Mutual Casualty	evelopers Surety & Inden
Submitted Entire Bid Package	Yes	Yes	Yes
Submitted Sub's Qualification Statement	No	Yes	Yes
DIR Status	Active	Active	Active
Error in Bid	No	Yes	Yes

CITY OF REDLANDS
MUNICIPAL UTILITIES & ENGINEERING DEPARTMENT
BID ANALYSIS

PROJECT NO. 521028 BID DATE: 9-Sep-2025

Joint Utilities Laboratory Building Renovation & Expansion Project EST. START DATE: 27-Oct-2025

Item No.	Bid Item	Quantity	Unit	CALTEC Corp.		Faris Consruction Co.		MLC Constructors, Inc.	
				Unit Price	Item Price	Unit Price	Item Price	Unit Price	Item Price
1	Mobilization (Maximum 5% of total bid price)	1	LS	$175,000	$175,000	$175,000	$175,000	$210,000	$210,000
2	Site Demolition	1	LS	$65,000	$65,000	$75,000	$75,000	$45,096	$45,096
3	Removal of all trash and debris, shrubs, bushes, and pavement	1	LS	$15,000	$15,000	$50,000	$50,000	$28,000	$28,000
4	Civil Site Work	1	LS	$145,000	$145,000	$575,000	$575,000	$296,451	$296,451
5	Reroofing of Existing Building Work	1	LS	$145,000	$145,000	$225,000	$225,000	$523,250	$523,250
6	Concrete Work	1	LS	$315,000	$315,000	$275,000	$275,000	$185,585	$182,585
7	Structural Work	1	LS	$358,000	$358,000	$250,000	$250,000	$395,902	$395,902
8	CMU Walls and Masonry Work	1	LS	$255,000	$255,000	$250,000	$250,000	$228,800	$228,800
9	Architectural Work	1	LS	$800,000	$800,000	$549,000	$549,000	$970,240	$970,240
10	HVAC Work	1	LS	$222,000	$222,000	$200,000	$200,000	$119,600	$119,600
11	Plumbing Work	1	LS	$35,000	$35,000	$25,000	$25,000	$36,400	$36,400
12	Electrical Work	1	LS	$560,000	$560,000	$800,000	$800,000	$727,090	$727,090
13	Fire Protection Systems (Including Fire Alarm and Sprinklers)	1	LS	$195,000	$195,000	$50,000	$50,000	$46,800	$46,800
14	Demobilization	1	LS	$15,000	$15,000	$25,000	$25,000	$5,000	$5,000
15	Remaining Work Not Specifically Listed	1	LS	$45,000	$45,000	$1,000	$1,000	$5,000	$5,000
16	Contingency: Unforeseen work not covered within all other bid items	1	LS	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000
17	Construct Trash Enclosure	1	LS	$85,000	$85,000	$60,000	$60,000	$79,969	$79,969
	Last Minute Additions/Deductions								$0
	Total Bid Price				**$3,730,000**		**$3,885,000**		**$4,200,183**

License Status	Active	Active	Active
Sub's License Status	Active	Active	Active
Bid Bond Company	Developers Surety & Indem.	US Specialty Insurance	Markel Insurance Co
Submitted Entire Bid Package	Yes	Yes	Yes
Submitted Sub's Qualification Statement	No	No	No
DIR Status	Active	Active	Active
Error in Bid	No	No	No

CITY OF REDLANDS
MUNICIPAL UTILITIES & ENGINEERING DEPARTMENT
BID ANALYSIS

PROJECT NO. 521028 BID DATE: 9-Sep-2025

Joint Utilities Laboratory Building Renovation & Expansion Project EST. START DATE: 27-Oct-2025

Item No.	Bid Item	Quantity	Unit	Kemcorp Construction, Inc.		Plyco Corp.			
				Unit Price	Item Price	Unit Price	Item Price	Unit Price	Item Price
1	Mobilization (Maximum 5% of total bid price)	1	LS	$225,000	$225,000	$219,723	$219,723		$0.00
2	Site Demolition	1	LS	$35,000	$35,000	$29,743	$29,743		$0.00
3	Removal of all trash and debris, shrubs, bushes, and pavement	1	LS	$35,000	$35,000	$32,400	$32,400		$0.00
4	Civil Site Work	1	LS	$600,000	$600,000	$415,800	$415,800		$0.00
5	Reroofing of Existing Building Work	1	LS	$725,000	$725,000	$154,224	$154,224		$0.00
6	Concrete Work	1	LS	$125,000	$125,000	$296,390	$296,390		$0.00
7	Structural Work	1	LS	$300,000	$300,000	$229,133	$229,133		$0.00
8	CMU Walls and Masonry Work	1	LS	$200,000	$200,000	$264,384	$264,384		$0.00
9	Architectural Work	1	LS	$350,000	$350,000	$778,140	$778,140		$0.00
10	HVAC Work	1	LS	$200,000	$200,000	$247,973	$247,973		$0.00
11	Plumbing Work	1	LS	$60,000	$60,000	$73,124	$73,124		$0.00
12	Electrical Work	1	LS	$1,000,000	$1,000,000	$488,723	$488,723		$0.00
13	Fire Protection Systems (Including Fire Alarm and Sprinklers)	1	LS	$100,000	$100,000	$123,379	$123,379		$0.00
14	Demobilization	1	LS	$25,000	$25,000	$72,657	$72,657		$0.00
15	Remaining Work Not Specifically Listed	1	LS	$220,000	$220,000	$969,073	$969,073		$0.00
16	Contingency: Unforeseen work not covered within all other bid items	1	LS	$300,000	$300,000	$300,000	$300,000		$0.00
17	Construct Trash Enclosure	1	LS	$35,000	$35,000	$54,000	$54,000		$0.00
	Last Minute Additions/Deductions								$0.00
	Total Bid Price				**$4,535,000**		**$4,748,866**		**$0.00**

The addition error corrected on the total bid price.

License Status	Active	Active	
Sub's License Status	Active	Active	
Bid Bond Company	Developers Surety & Indem.	Travelers Casualty & Surety	
Submitted Entire Bid Package	Yes	Yes	
Submitted Sub's Qualification Statement	No	Yes	
DIR Status	Active	Active	
Error in Bid	No	No	

CONSTRUCTION PLANS FOR
CITY OF REDLANDS

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT

PROJECT No. 521028

PHASE 1

JUNE 2025



N

VICINITY MAP
NTS

ADDRESS: 1950 NEVADA ST, REDLANDS CA 92373

RED ZIGZAG CLOUDS WITH AN OPEN TRIANGLE SYMBOL INDICATE CLARIFICATIONS TO PHASE 1 SCOPE. THESE ARE FOR INFORMATION ONLY AND DO NOT REPRESENT CHANGES TO THE DESIGN.

CLOUDS WITH DELTA SYMBOL INDICATE ADDENDUM 1 CHANGES TO THE DESIGN.

CITY COUNCIL:

MARIO SAUCEDO, MAYOR
MARC SHAW, MAYOR PRO
PAUL T. BARICH, COUNCIL MEMBER
EDDIE TEJEDA, COUNCIL MEMBER
DENISE DAVIS, COUNCIL MEMBER

CITY CLERK:

JEANNE DONALDSON, CITY CLERK

CITY STAFF:

CHARLES M. DUGGAN JR., CITY MANAGER

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER BRIAN JOHN LEITO C80821 CIVIL STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

TITLE SHEET

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 1 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

G-1.1

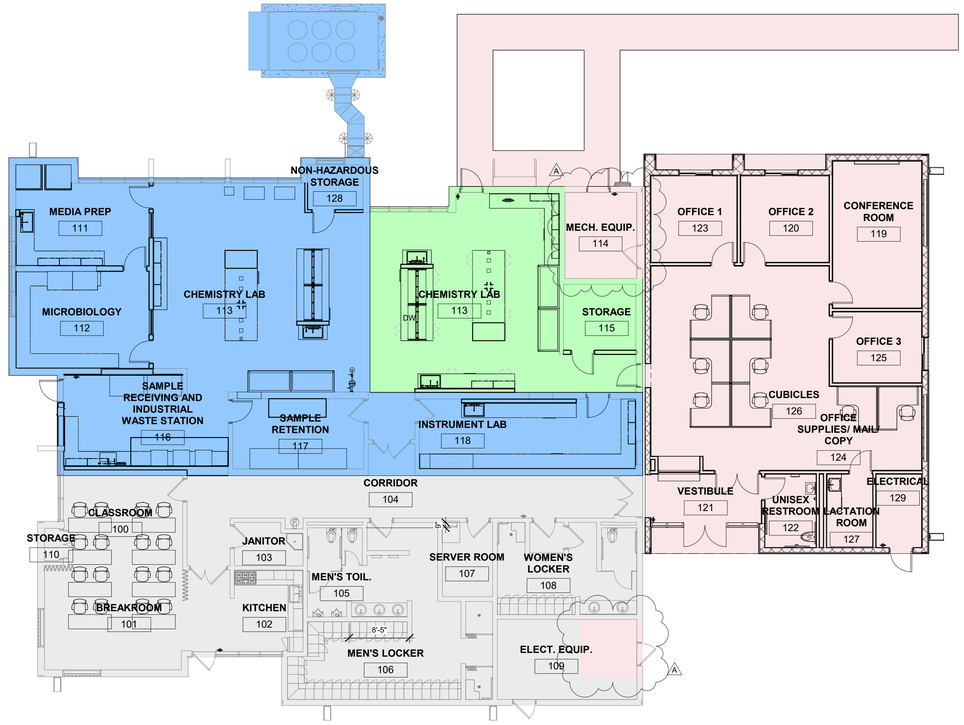
WW-00007

DRAWING INDEX

SHEET #	SHEET TITLE
G-1.1	TITLE SHEET
G-1.2	DRAWING INDEX
G-1.3	LEGENDS, ABBREVIATIONS, & GENERAL NOTES
G-1.4	CODE ANALYSIS & LIFE SAFETY PLAN
G-1.5	EXISTING SITE PLAN
G-1.6	CALGREEN MANDATORY CHECKLIST 1
G-1.7	CALGREEN MANDATORY CHECKLIST 2
GC-1	SITE ACCESS AND CONSTRUCTION STAGING AREA
CD-1	CIVIL DEMOLITION PLAN
C-1	SITE PLAN
C-2	CIVIL DETAILS
AD-1.1	DEMOLITION - FLOOR PLAN
~~AD-2.1~~	~~DEMOLITION - REFLECTED CEILING PLAN~~
AD-3.1	DEMOLITION - ROOF PLAN
AD-4.1	DEMOLITION - EXTERIOR ELEVATIONS
~~AD-5.1~~	~~DEMOLITION - BUILDING SECTIONS~~
A-1.0	FLOOR PLAN - DIMENSIONS
A-1.1	FLOOR PLAN
~~A-1.2~~	~~CHEMISTRY LAB ENLARGED FLOOR PLAN~~
~~A-1.3~~	~~EQUIPMENT LIST 1~~
~~A-1.4~~	~~EQUIPMENT LIST 2~~
~~A-1.5~~	~~EQUIPMENT LIST 3~~
~~A-1.6~~	~~CHEMISTRY LAB SOLIDS COUNTER ENLARGED FLOOR PLAN AND ELEVATIONS~~
~~A-1.7~~	~~CHEMISTRY LAB BOD COUNTER ENLARGED FLOOR PLAN AND ELEVATIONS~~
~~A-1.8~~	~~CHEMISTRY LAB SPEC/ ALKALINITY/ TURBIDITY COUNTER ENLARGED FLOOR PLAN AND ELEVATIONS~~
~~A-1.9~~	~~CHEMISTRY LAB TBD COUNTER ENLARGED FLOOR PLAN AND ELEVATIONS~~
~~A-1.10~~	~~CHEMISTRY LAB NORTHERN AND EASTERN WALL COUNTERS ENLARGED FLOOR PLAN AND ELEVATIONS~~
~~A-1.11~~	~~CHEMISTRY LAB WESTERN AND SOUTHERN WALL COUNTERS ENLARGED FLOOR PLAN AND ELEVATIONS~~
~~A-1.12~~	~~MEDIA PREP ENLARGED FLOOR PLAN AND ELEVATIONS~~
~~A-1.13~~	~~MICROBIOLOGY ENLARGED FLOOR PLAN AND ELEVATIONS~~
~~A-1.14~~	~~SAMPLE RECEIVING AND INDUSTRIAL WASTE STATION ENLARGED FLOOR PLAN AND ELEVATIONS~~
~~A-1.15~~	~~SAMPLE RETENTION ENLARGED FLOOR PLAN AND ELEVATIONS~~
~~A-1.16~~	~~INSTRUMENT LAB ENLARGED FLOOR PLAN AND ELEVATIONS~~
A-1.17	ENLARGED FLOOR PLAN OF ADDITION WITH FURNITURE & CUBICLE LAYOUT
A-2.1	ROOF PLAN
A-3.1	EXTERIOR ELEVATIONS
A-4.1	BUILDING SECTIONS
A-5.1	CONSTRUCTION PHASING FLOOR & SITE PLAN
A-6.1	REFLECTED CEILING PLAN
A-7.1	INTERIOR ELEVATIONS 1
A-7.2	INTERIOR ELEVATIONS 2
A-7.3	INTERIOR ELEVATIONS 3
A-8.1	WALL SECTIONS 1
A-8.2	WALL SECTIONS 2
A-9.1	DOOR AND WINDOW SCHEDULES
A-9.2	DOOR AND WINDOW DETAILS
A-10.1	FINISH SCHEDULE AND PARTITION TYPES
A-11.1	CASEWORK DETAILS
A-12.1	ROOF AND EXPANSION JOINT DETAILS
A-12.2	ROOF AND EXPANSION JOINT DETAILS EXISTING
~~A-12.3~~	~~LABORATORY DETAILS 1~~
~~A-12.4~~	~~LABORATORY DETAILS 2~~
~~A-12.5~~	~~LABORATORY DETAILS 3~~
A-12.6	SIGNAGE TYPES DETAILS
A-12.7	CEILING AND WALL FRAMING DETAILS
A-13.1	TITLE 24 CALCULATIONS AND FORMS 1
A-13.2	TITLE 24 CALCULATIONS AND FORMS 2
A-13.3	TITLE 24 CALCULATIONS AND FORMS 3
A-14.1	AXONOMETRIC VIEWS
S-1	STRUCTURAL GENERAL NOTES 1
S-2	STRUCTURAL GENERAL NOTES 2
S-3	STRUCTURAL SPECIAL INSPECTION 1
S-4	STRUCTURAL SPECIAL INSPECTION 2
S-5	STRUCTURAL FOUNDATION PLAN
S-6	STRUCTURAL ROOF PLAN
S-7	STRUCTURAL SECTIONS
SD-1	STRUCTURAL STANDARD DETAILS 1
SD-2	STRUCTURAL STANDARD DETAILS 2
SD-3	STRUCTURAL STANDARD DETAILS 3
SD-4	STRUCTURAL STANDARD DETAILS 4
SD-5	STRUCTURAL STANDARD DETAILS 5
~~MD-1~~	~~HVAC DEMOLITION FLOOR PLAN - PHASE 2-A~~
~~MD-2~~	~~HVAC DEMOLITION ROOF PLAN - PHASE 2-A~~
~~MD-3~~	~~HVAC DEMOLITION FLOOR PLAN - PHASE 2-B~~
~~MD-4~~	~~HVAC DEMOLITION ROOF PLAN - PHASE 2-B~~
M-1	HVAC ABBREVIATION, SYMBOLS AND GENERAL NOTES
M-2	HVAC CONSTRUCTION PHASES
M-3	HVAC PLANS - PHASE 1
~~M-4~~	~~HVAC MODIFICATIONS FLOOR PLAN - PHASE 2-A~~
~~M-5~~	~~HVAC MODIFICATIONS ROOF PLAN - PHASE 2-A~~
~~M-6~~	~~HVAC MODIFICATIONS FLOOR PLAN - PHASE 2-B~~
~~M-7~~	~~HVAC MODIFICATIONS ROOF PLAN - PHASE 2-B~~
M-8	HVAC FLOW DIAGRAMS 1
~~M-9~~	~~HVAC FLOW DIAGRAMS 2~~
M-10	HVAC SCHEDULES
M-11	HVAC DETAILS

DRAWING INDEX

SHEET #	SHEET TITLE
M-12	TITLE 24 MECHANICAL FORMS – SHEET 1
M-13	TITLE 24 MECHANICAL FORMS – SHEET 2
M-14	TITLE 24 MECHANICAL FORMS – SHEET 3
M-15	TITLE 24 MECHANICAL FORMS – SHEET 4
M-16	TITLE 24 MECHANICAL FORMS – SHEET 5
P-1	PLUMBING ABBREVIATION, SYMBOLS AND GENERAL NOTES
P-2	PLUMBING CONSTRUCTION PHASES
P-3	PLUMBING PLANS - PHASE 1
~~P-4~~	~~PLUMBING MODIFICATIONS PLAN - PHASE 2-A~~
~~P-5~~	~~HVAC MODIFICATIONS ROOF PLAN - PHASE 2-B~~
~~P-6~~	~~PLUMBING ISOMETRIC PLANS~~
P-7	PLUMBING SCHEDULES
P-8	PLUMBING DETAILS
FA-1	GENERAL NOTES AND LEGEND
FA-2	FIRE ALARM PLAN
FA-3	RISER DIAGRAM & SYSTEM I/O MATRIX
FP-1	GENERAL NOTES AND LEGEND
FP-2	FIRE PROTECTION PLAN
FP-3	FIRE PROTECTION DETAILS
~~ED-1~~	~~ELECTRICAL DEMOLITION - MCC OB ONELINE DIAGRAM~~
ED-2	ELECTRICAL DEMOLITION LIGHTING PLAN
ED-3	ELECTRICAL DEMOLITION POWER PLAN
~~ED-4~~	~~ELECTRICAL DEMOLITION PANELBOARD SCHEDULES~~
E-1	ELECTRICAL LEGEND 1
E-2	ELECTRICAL LEGEND 2
E-3	ELECTRICAL GENERAL NOTES
E-4	ELECTRICAL OVERALL SITE PLAN
E-5A	ELECTRICAL EXISTING MCC OB ONELINE DIAGRAM
~~E-5B~~	~~ELECTRICAL SWBD OB ONELINE DIAGRAM~~
E-6	ELECTRICAL LIGHTING FIXTURE SCHEDULE AND RISER DIAGRAM
E-7	ELECTRICAL POWER, DATA, COMMUNICATION, SECURITY & GROUNDING PLAN
E-8	ELECTRICAL LIGHTING AND CEILING POWER PLAN
E-9	ELECTRICAL ROOF POWER PLAN
E-10	ENLARGED ELECTRICAL ROOM PLAN/ TEMPORARY POWER PLAN
E-11	ELECTRICAL PANELBOARD SCHEDULES
E-12	ELECTRICAL TITLE 24 CALCULATIONS AND FORMS SHEET 1
E-13	ELECTRICAL TITLE 24 CALCULATIONS AND FORMS SHEET 2
~~E-14~~	~~ELECTRICAL TEMPORARY MCC ONELINE DIAGRAM~~
~~E-15~~	~~ELECTRICAL DETAILS 1~~
E-16	ELECTRICAL DETAILS 2



CONSTRUCTION SEQUENCE PLAN

1/8" = 1'-0"

CONSTRUCTION SEQUENCE

PHASE 1

BUILD THE OFFICE EXPANSION AND RELOCATION OF UTILITIES AS INDICATED ON CIVIL DRAWINGS. ADMINISTRATIVE STAFF TO BE RELOCATED INTO THE OFFICE WING BY OWNER. THIS INCLUDES FLEX SPACE FOR LABORATORY TECHNICIANS.

PHASE 2A NOT IN SCOPE

~~CONTRACT FOR CONSTRUCTION OF THE MICROBIOLOGY AND MEDIA PREPARATION LABORATORIES AND INSTRUMENTATION ROOM. THE CONTRACTOR WILL HAVE FULL ACCESS TO THE WEST SIDE OF THE LABORATORY, INCLUDING ENTRY FROM THE EXISTING LOBBY, TO PERFORM RENOVATIONS, WHILE THE EXISTING EAST LABORATORY AREA REMAINS OPERATIONAL WITH ACCESS MAINTAINED FROM THE SOUTH CORRIDOR AND NEW OFFICE EXPANSION.~~

EXISTING NOT IN SCOPE

~~MINOR PATCH AND REPAIR DURING PHASE 2A~~

PHASE 2B NOT IN SCOPE

~~MOVE ALL LABORATORY OPERATIONS INTO THE NEWLY RENOVATED WEST LABORATORY AREA AND RENOVATE THE EAST LABORATORY AREA.~~

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT
RICHARD D. CHONG
NO. C 31...
REN. 08/30/27
STATE OF CALIFORNIA

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

DRAWING INDEX

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 2 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

G-1.2

WW-00007

ABBREVIATIONS

&	AND	GL	GLASS	RECT	RECEPTACLE
<	ANGLE	GB	GLASS BLOCK	REF	ROOF EXHAUST FAN
@	AT	GRT	GRATING	REINF	REINFORCE (D, ING)
AB	ANCHOR BOLT	GYP	GYPSUM	REQ'D	REQUIRED
ABV	ABOVE	GWB	GYPSUM WALL BOARD	REV	REVISED
ACMU	ACOUSTICAL CONCRETE MASONRY UNIT	HARD	HARDENER	RF	ROOF FAN
AFF	ABOVE FINISHED FLOOR	HD	HEAVY DUTY	RFG	ROOFING
AFG	ABOVE FINISHED GRADE	HDWD	HARDWOOD	RGH	ROUGH
AL, ALUM	ALUMINUM	HDWR	HARDWARE	RJ	REVEAL/RUSTICATION JOINT
AMP	ACOUSTICAL METAL PANELS	HGR	HANGER	RL	RAIN LEADER
ANOD	ANODIZE(D)	HGT	HEIGHT	RLG	RAILING
ASSY	ASSEMBLY	HM	HOLLOW METAL	RM	ROOM
BBT	BIOBASED TILE	HOR	HORIZONTAL	RO	ROUGH OPENING
BD	BOARD	HP	HIGH POINT	RT	RUBBER TILE
BEV	BEVEL(ED)	HR	HANDRAIL	RWL	RAIN WATER LEADER
BLDG	BUILDING	IN	INCH	S	STEEL S-SHAPED DESIGNATION
BLK	BLOCK	INST	INSTRUMENTATION	SAT	SUSPENDED ACOUSTICAL TILE
BLKG	BLOCKING	INSUL	ISULATION	SB	SEAMLESS BASE
BRG	BEARING	JC	JANITOR'S CLOSET	SCHD	SCHEDULE
BRK	BRICK	JT	JOINT	SCRN	SCREEN(ED, ING)
BRS	BRASS	JT FLR	JOINT FILLER	SECT	SECTION
BRZ	BRONZE	L	LINE OF STRUCTURAL ANGLE DESIGNATION	SF	SEAMLESS FLOORING
BTM	BOTTOM	LAB	LABORATORY	SGFT	STRUCTURAL GLAZED FACING TILE
C TO C	CENTER TO CENTER	LAD	LADDER	SHT	SHEET
CAB	CABINET	LAM	LAMINIATED	SIM	SIMILAR
CEM	CEMENT	LAV	LAVATORY	SK	SINK
CF	COMPRESSIBLE FILLER	LG	LAMINATED GLASS	SL	SLOPE
CGFB	CEMENTITIOUS GLASS FIBER BOARD	LINO	LINOLEUM	SLNT	SEALANT
CH	CONCRETE HARDENER	LKR	LOCKER	SPEC	SPECIFICATION, SPECIFIED
CHAM	CHAMFER	LNTL	LINTEL	SST	STAINLESS STEEL
CHAN	CHANNEL	LP	LOW POINT	STD	STANDARD
CIP	CAST IN PLACE	LT	LIGHT(S)	STL	STEEL
CJ	CONTROL JOINT	MAS	MASONRY	STOR	STORAGE
CL OR	CENTERLINE	MATL	MATERIAL	STRU	STRUCTURE(S, URAL)
CLG	CEILING	MAX	MAXIMUM	STWY	STAIRWAY
CLKG	CAULKING	MEMB	MEMBRANE	SUPT	SUPERINTENDENT
CMU	CONCRETE MASONRY UNIT	MFR	MANUFACTURER	SUSP	SUSPENDED
COL	COLUMN	MIN	MINIMUM	T	TREAD(S)
COMP	COMPRESSIBLE	MISC	MISCELLANEOUS	TBM	TRAFFIC BEARING MEMBRANE
CONC	CONCRETE	MO	MASONRY OPENING	T&G	TONGUE AND GROOVE
CONT	CONTINUOUS	MR	MOISTURE RESISTANT	TEMP	TEMPERATURE
CRPT	CARPET, CARPET TILE	MRAT	MOISTURE RESISTANT ACOUSTICAL TILE	TER	TERRAZZO
CRS	COURSE(S)	MTD	MOUNTED	TERB	TERRAZZO BASE
CT	CERAMIC TILE	MTG	MOUNTING	THK	THICK(NESS)
DET	DETAIL	MTL	METAL	THR	THRESHOLD
DF	DRINKING FOUNTAIN	NIC	NOT IN CONTRACT	TKBD	TACKBOARD
DIA	DIAMETER	NOM	NOMINAL	TOB	TOP OF BRICK
DIAG	DIAGONAL	NTS	NOT TO SCALE	TOC	TOP OF CONCRETE
DIM	DIMENSION	OC	ON CENTER	TOIL	TOILET
DISP	DISPENSER	OH	OVERHANG	TOM	TOP OF MASONRY
DN	DOWN	OPNG	OPENING	TOPG	TOPPING
DP	DAMPPROOFING	OPP HD	OPPOSITE HAND	TOS	TOP OF STEEL
DR	DRAIN	ORD	OVERFLOW ROOF DRAIN	TS	STRUCTURAL TUBING (STEEL UNLESS NOTED)
ELEC	ELECTRICAL	OSB	ORIENTED STRAND BOARD	TSL	TOP OF SLAB
ELEV	ELEVATION	OV	OVER	TWF	THROUGH WALL FLASHING
EQ	EQUAL(LY)	OVHD	OVERHEAD	TYP	TYPICAL
EQPT	EQUIPMENT	PERIM	PERIMETER	UC	UNDERCUT
EWC	ELECTRICAL WATER COOLER	PL	PLATE	UON	UNLESS OTHERWISE NOTED
EXP	EXPOSED	PL	PROPERTY LINE	UR	URINAL
EJ	EXPANSION JOINT	PLAS	PLASTER	VB	VAPOR BARRIER
EXIST, (E)	EXISTING	PLK	PLANK	VCT	VINYL COMPOSITE TILE
FD	FLOOR DRAIN	PLYWD	PLYWOOD	VERT	VERTICAL
FE	FIRE EXTINGUISHER	PM	PRESSED METAL	VEST	VESTIBULE
FF	FACTORY FINISH	PR	PAIR	VTR	VENT THRU ROOF
FGL	FIBERGLASS	PRD	PROMENADE ROOF DRAIN	W	WITH
FIN	FINISH(ED)	PRCST	PRECAST	W/	WITH
FLG	FLASHING	PREFAB	PRE-FABRICATED	W/A	WHERE APPLICABLE
FL	FLOOR(ING)	PT	PREASSURE TREATED	W/O	WITHOUT
FLR	FILLER	PRMLD	PREMOLDED	WC	WATER CLOSET
FR	FRAME	PSF	POUNDS PER SQUARE FOOT	WD	WOOD
FRP	FIBERGLASS REINFORCED PLASTIC	PTD	PAINTED	WDW	WINDOW
FO	FRAME OPENING	QT	QUARRY TILE	WF	WIDE FLANGE
FV	FIELD VERIFY	QTB	QUARRY TILE BASE	WPG	WATERPROOFING
FXD	FIXED	R	RISER(S)	WT	STEEL TEE-SHAPE DESIGNATION
GA	GAGE, GAUGE	R+S	BACKER ROD & SEALANT	WWF	WELDED WIRE FABRIC
GALV	GALVANIZED	RB	RUBBER BASE		
GC	GENERAL CONTRACTOR	RD	ROOF DRAIN		

GENERAL NOTES

HEIGHT OF INTERIOR STUD AND CMU PARTITIONS ARE FROM FLOOR TO THE UNDERSIDE OF ROOF DECK UNLESS OTHERWISE NOTED. PROVIDE DEFLECTION HEADS AT TOP OF WALL (TYPICAL).

NOT ALL EQUIPMENT IS SHOWN FOR CLARITY. REFER TO THE APPROPRIATE DISCIPLINE SHEETS FOR SPECIFIC EQUIPMENT LAYOUT AND OTHER REQUIREMENTS

SEE CIVIL SHEETS FOR SIDEWALK, ROAD PAVING AND FINISH GRADE ELEVATIONS.

SEE STRUCTURAL SHEETS FOR SIZE AND LOCATION OF CONCRETE PADS, TRENCHES, VAULTS, SUMPS, ETC

SEE STRUCTURAL SHEETS FOR CONCRETE AND MASONRY REINFORCEMENT

PATCH AND REPAIR ANY MATERIALS OR SURFACES DAMAGED DURING THE CONSTRUCTION PROCESS TO MATCH THE EXISTING ADJACENT SURFACES.

ALL ITEMS TO BE NEW UNLESS SPECIFICALLY NOTED OTHERWISE.

ALL JOINTS, VOIDS AND PENETRATIONS THROUGH FIRE-RATED WALL SYSTEMS ARE TO BE FILLED/SEALED WITH UL APPROVED FIRESAFING/FIRESTOPPING MATERIALS TO ACHIEVE THE REQUIRED FIRE-RATING (REFER TO CODE DRAWINGS FOR LOCATIONS).

DO NOT SCALE FROM THE DRAWINGS

NOTIFY ARCHITECT IF CONSTRUCTION DOCUMENTS DIFFER FROM ACTUAL FIELD CONDITIONS PRIOR TO FABRICATION OR NEW CONSTRUCTION

THIS DRAWING CONTAINS A GENERAL LIST OF SYMBOLS AND ABBREVIATIONS. NOT ALL ITEMS SHOWN HERE APPEAR ON THE CONTRACT DRAWINGS.

LINE TYPES (UNLESS OTHERWISE NOTED)

CONTINUOUS - NEW CONSTRUCTION

DASHED ON CONSTRUCTION PLAN/SHEETS - HIDDEN ELEMENTS BEYOND, ABOVE OR BELOW

MATERIAL SYMBOLS

EARTH

GRAVEL

BRICK

CONCRETE MASONRY UNIT (CMU)

PRECAST CONCRETE

CAST-IN-PLACE CONCRETE

WOOD BLOCKING

WOOD FINISH

PLYWOOD

RIGID INSULATION

BLANKET INSULATION

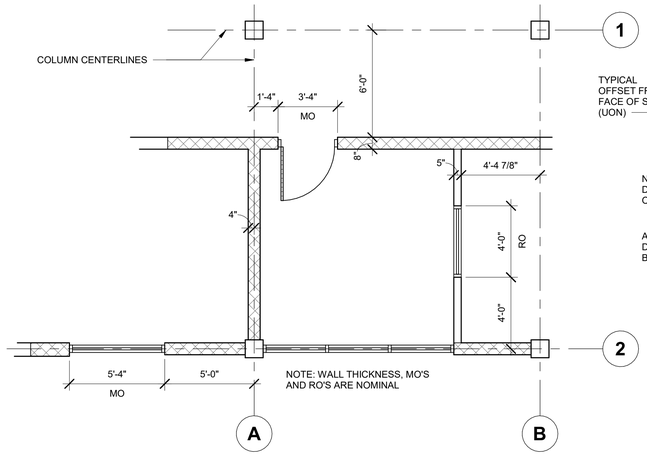
STEEL

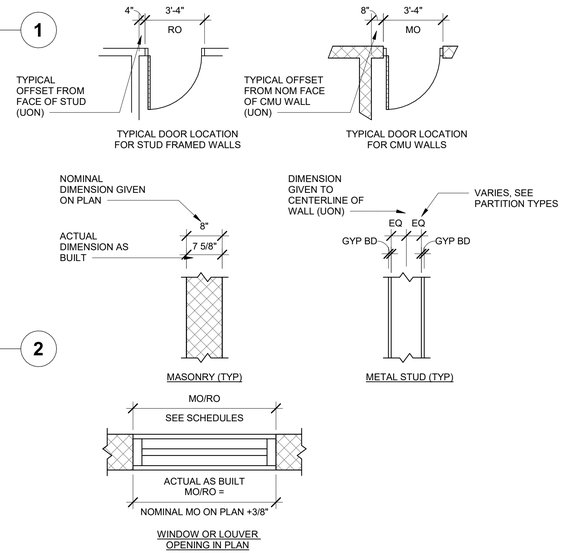
ALUMINUM

STUCCO / GROUT

CAULK

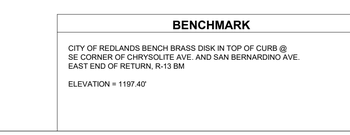
DIMENSIONING SYSTEM





OPENINGS

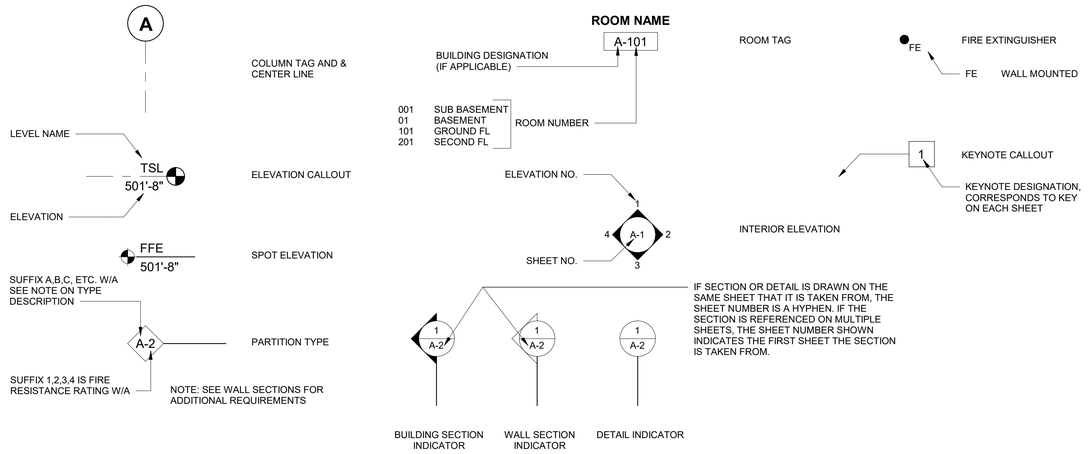
USUALLY LABELED IN PLAN VIEW; HOWEVER, OPENINGS NOT SHOWN IN PLAN ARE LABELED ON ELEVATIONS







SYMBOLS



CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER
RICHARD D. CHONG
NO. C 81771
REN. 08/30/27
STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

LEGENDS, ABBREVIATIONS, & GENERAL NOTES

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

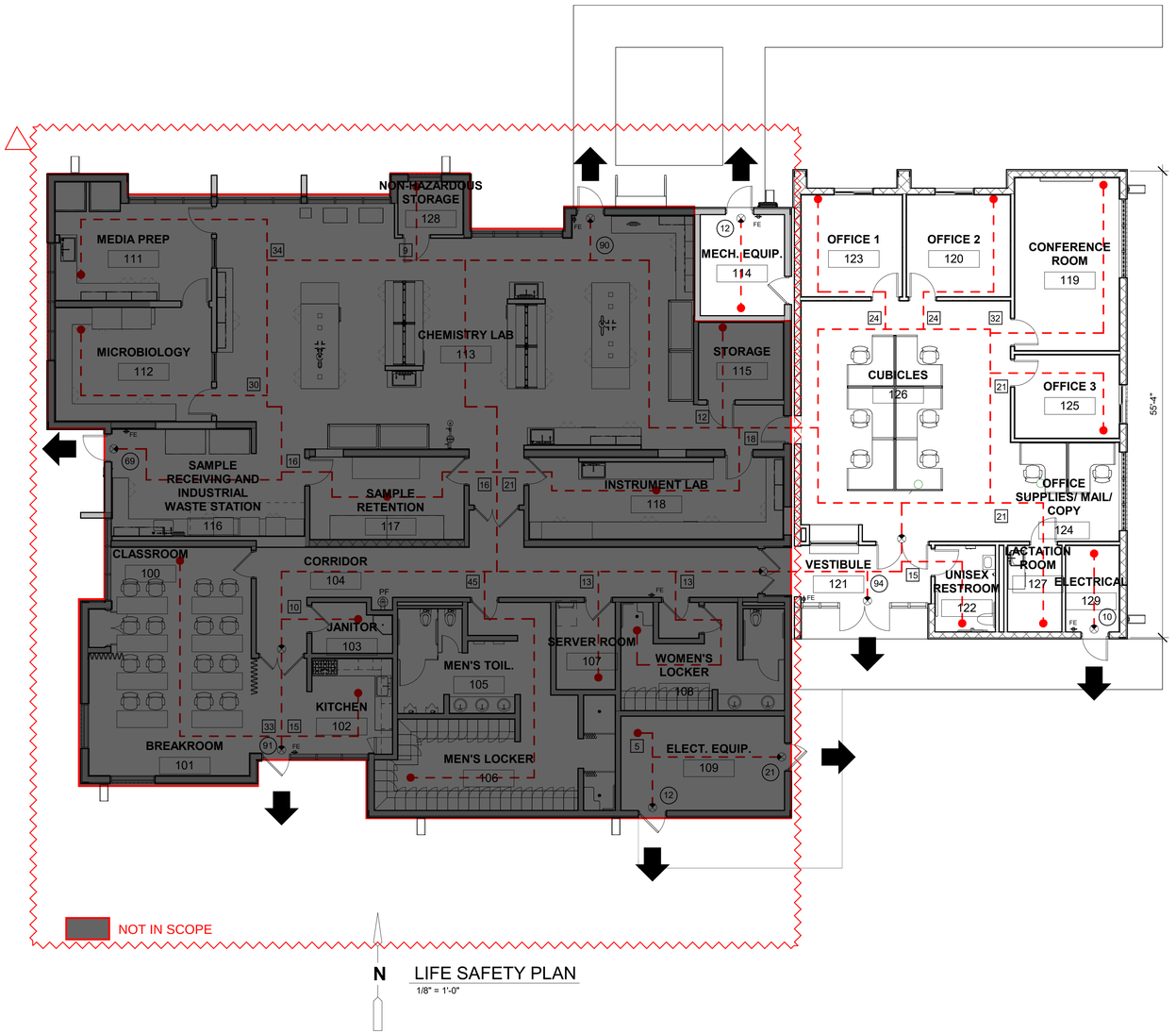
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 3 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

G-1.3

WW-00007



LIFE SAFETY LEGEND

- EXIT DISCHARGE
- AREA OR SPACE EXIT
- EXIT SIGN
- FE — FIRE EXTINGUISHER
- EGRESS PATH
- (X) — TRAVEL DISTANCE (FEET)
- [X] — COMMON PATH OF TRAVEL (FEET)

BUILDING CODE SUMMARY

OWNER	CITY OF REDLANDS - MUNICIPAL UTILITIES AND ENGINEERING DEPARTMENT
ADDRESS	1950 NEVADA ST, REDLANDS CA 92373
PROJECT NAME	JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT NUMBER	298407
BUILDING NAME	JOINT UTILITIES LABORATORY BUILDING
DESCRIPTION:	NEW CMU BUILDING WITH PARAPET TPO ROOF CONNECTED TO EXISTING CMU BUILDING.

APPLICABLE CODES
2022 CALIFORNIA BUILDING CODE (CBC)
2022 CALIFORNIA ELECTRICAL CODE (CEC)
2022 CALIFORNIA MECHANICAL CODE (CMC)
2022 CALIFORNIA PLUMBING CODE (CPC)
2022 CALIFORNIA ENERGY CODE (CEnC)
2022 CALIFORNIA FIRE CODE (CFC)
2022 CALIFORNIA GREEN BUILDING STANDARDS CODE (CGBSC)
CITY OF REDLANDS MUNICIPAL CODES

BUILDING CLASSIFICATION
OCCUPANCY - SECTION 304 — GROUP B (BUSINESS)
CONSTRUCTION - SECTION 602.2 — TYPE II B, NON COMBUSTIBLE, SPRINKLERED

BUILDING HEIGHTS AND AREAS	ALLOWABLE	ACTUAL
TABLE 504.3	75 FT	16'-0"
TABLE 504.4	4 STORIES	1 STORY
TABLE 506.2	92,000 SF	5,800 SF (EXISTING)
		1,990 SF (NEW EXPANSION)
		TOTAL 7,790

GROUP B (BUSINESS)

OCCUPANT LOAD
TABLE 1004.5

LAB AREA
2843 SF / 100 SF PER OCCUPANT = 28

CONFERENCE, CLASSROOM, AND BREAKROOM
742 SF / 15 SF PER OCCUPANT = 49

KITCHEN
190 SF / 200 SF PER OCCUPANT = 1

EQUIPMENT ROOMS AND STORAGE
669 SF / 300 SF PER OCCUPANT = 2

OFFICE AREA
1372 SF / 100 SF PER OCCUPANT = 9

TOTAL = 89 OCCUPANT LOAD

EGRESS WIDTH SECTION 1005.3.2	REQUIRED	89 OCCUPANTS X 0.15 = 13.4 IN		ACTUAL	ALL EXIT DOORS ≥ 36 IN, SEE SCHD
COMMON PATH OF TRAVEL TABLE 1006.2.1	MAXIMUM	100 (S)	FEET	ACTUAL	ALL <100', SEE PLAN
EXITS PER SPACE TABLE 1006.3.3	REQUIRED	2		ACTUAL	4
MAX TRAVEL DISTANCE CBC 1017.2	MAXIMUM	300 (S)	FEET	ACTUAL	ALL <300', SEE PLAN

FIRE RESISTANCE RATING DISTANCE
TABLE 601

BUILDING ELEMENTS (TYPE IIB)	
PRIMARY STRUCTURAL FRAME	0-HOURS
BEARING WALLS:	
EXTERIOR	0-HOURS
INTERIOR	0-HOURS
NON-BEARING WALLS AND PARTITIONS:	
INTERIOR	0-HOURS
FLOOR CONSTRUCTION:	
INCLUDING SECONDARY MEMBERS (SUPPORTING BEAMS AND JOISTS)	0-HOURS
ROOF CONSTRUCTION:	
INCLUDING SECONDARY MEMBERS (SUPPORTING BEAMS AND JOISTS)	0-HOURS

FIRE SEPARATION DISTANCE
TABLE 705.5
TYPE II B ≥ 30 FEET FROM BLDGS & PROPERTY LINE — 0-HOURS

AUTOMATIC SPRINKLER SYSTEM

SPRINKLERS REQUIRED 903.2	NO	PROVIDED	YES
FIRE ALARM REQUIRED 907.2.2	NO	PROVIDED	YES

PLUMBING FIXTURES
TABLE 2902.1

WATER CLOSETS REQ'D	3	PROVIDED	4 - 2 MALE, 1 FEMALE, 1 UNISEX
LAVATORIES REQ'D	2	PROVIDED	6 - 3 MALE, 2 FEMALE, 1 UNISEX
DRINKING FOUNTAIN REQ'D	1	PROVIDED	1
SERVICE SINK REQ'D	1	PROVIDED	1

BUILDING ENVELOPE: CLIMATE ZONE 10 REDLANDS
TABLE 140.3-B

ROOF INSULATION	U-0.034
WALLS MASS HEAVY	U-0.650
SOFFITS RAISED MASS	U-0.269
NON-SWINGING DOORS	U-1.45
SWINGING DOORS	U-0.70
AGED SOLAR REFLECTANCE (LOW-SLOPED)	U-0.63
THERMAL EMITTANCE (LOW-SLOPED)	U-0.75
AIR BARRIER	REQUIRED
FIXED WINDOWS	U-0.36 SHGF-0.25

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT — RICHARD D. CHONG — NO. C 31719 — REN. 08/30/27 — STATE OF CALIFORNIA

5-14-2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

CODE ANALYSIS & LIFE SAFETY PLAN

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 4 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

G-1.4

WW-00007

SURVEY

CAR STOP		APN	ASSESSOR'S PARCEL NUMBER
CONTROL POINT		BFV	BACKFLOW PREVENTER
DOOR		EPB	ELECTRIC PULL BOX
ELECTRIC MANHOLE	(E)	FDC	FIRE DEPARTMENT CONNECTION
ELECTRIC METER		FS	FINISH SURFACE
ELECTRIC OUTLET		FL	FLOW LINE
FIRE HYDRANT		ICV	IRRIGATION CONTROL VALVE
FIRE DEPARTMENT CONNECTION		NG	NATURAL GROUND
FOUND MONUMENT AS NOTED		TPB	TELCO PULL BOX
HANDICAP		TOS	TOP OF SLOPE
LIGHT STANDARD		TC	TOP OF CURB
POST INDICATOR VALVE	PIV	WM	WATER METER
SIGN		CANOPY	
TREE (TYPICAL)		FLOW LINE	
WATER VALVE		TOE	TOE OF SLOPE
WATER FAUCET			
PROPOSED ADDITION			

N

1" = 10'

5 0 10

EXST ELEC CONDUIT TO REMAIN
6"-VCP-SS
INV (-4.02')
EXST IRR CONTROL VALVE BOX
1"-PVC-IRR
INV (-1.11')
EXST HOSE BIBB TO REMAIN
SHUT-OFF VALVE
EXST IRR TO REMAIN
EXST SHUT-OFF VALVE STATION TO REMAIN
EXST IRR TO REMAIN
EXST GAS TO REMAIN
EXST 2"-CU-PW
EXST 6"-DI-FW
2"-CU-PW
INV (-3.80')
1"-PVC-IRR
INV (-0.91')
6"-DI-FW
INV (-5.54')
EXST IRR
PROPOSED ADDITION
EXST 2"-CU-PW
EXST 6"-DI-FW
1"-PVC-IRR
INV (-1.37')
2"-CU-PW
INV (-5.72')
EXST IRR
EXST 2"-CU-PW
ICV
GRASS
RELOCATE EXST FDC
RELOCATE EXST PIV
REMOVE EXST VAULT
RELOCATE EXST FIRE HYDRANT
ELEC MANHOLE
1"-PVC-IRR
INV (-1.21')
EXST IRR TO REMAIN
PLANTER
DIRT
GRASS
PLANTER
EXISTING LAB BUILDING
VISITOR PARKING

SITE PLAN
1" = 10'

POTHOLE DATA

POTHOLE NO.	UTILITY	UTILITY SIZE	UTILITY MATERIAL	TOP DEPTH	BOTTOM DETPH	SOIL CONDITION
1	SS	6"	VCP	3.360-FT	4.02-FT	LOAM
2	I/RW	1"	PVC	0.800-FT	0.91-FT	LOAM
2A	I/RW	1"	PVC	1.00-FT	1.11-FT	LOAM
3	I/RW	1"	PVC	1.260-FT	1.37-FT	LOAM
4	I/RW	1"	PVC	1.100-FT	1.21-FT	LOAM
5	PW	2"	COPPER	3.620-FT	3.80-FT	LOAM
5A	W	6"	DIP	4.960-FT	5.54-FT	LOAM
6	PW	2"	COPPER	5.540-FT	5.72-FT	LOAM

NOTES:

1. POTHOLE LOCATIONS ARE APPROXIMATE. CONTRACTOR SHALL FIELD VERIFY UTILITY LOCATIONS PRIOR TO EXCAVATION.
2. PIPING WAS NOT SURVEYED. PIPING SHOWN IS BASED ON RECORD INFORMATION, FOR REFERENCE ONLY.

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
	Revisions			

CDM Smith
600 Wilshire Blvd #750
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER — GAUTAM K. DOBEY — NO. 70319 — CIVIL — STATE OF CALIFORNIA

5-14-2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT PROJECT No. 521028

EXISTING SITE PLAN

Designed by: M. MA	REVIEWED BY: 6/11/2025
Date: MAY 2025	Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
Checked by: B. LETO	APPROVED BY: 6/11/2025
Date: MAY 2025	Goutam K. Dobey, City Engineer, R.C.E. 75646 DATE
Drawn by: W. TALBOT	Sheet 5 of 126 Sheets
Date: MAY 2025	Scale Horiz. X
Checked by: M. MA	Vert. X
Date: MAY 2025	G-1.5

WW-00007

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10/22/2024 1:05 PM

A5.602
***CALGreen* VERIFICATION GUIDELINES**
MANDATORY MEASURES CHECKLIST
2022 CALGreen Code with July 1, 2024 Supplement

Application: This checklist shall be used for nonresidential projects that meet one of the following: new construction, building additions of 1,000 square feet or greater, or building alterations with a permit valuation of $200,000 or more pursuant to Section 301.3 AND do not trigger a Tier 1 or Tier 2 requirement:

Y = Yes (section has been selected and/or included)
N/A = Not Applicable (code section does not apply to the project—mainly used for additions and alterations)
O = Other (provide explanation)
[N] = New construction pursuant to Section 301.3
[A] = Additions and/or Alterations pursuant to Section 301.3

Chapter 5 Divisions

DIVISION 5.1 Planning and Design

Requirement	SECTION TITLE	CODE SECTION	Y	N	N/A	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
Mandatory	Deconstruction and reuse of existing structures, Scope with Exception	5.105.1			X		
Mandatory	Reuse of existing building & Verification of compliance with note	5.105.2 and 5.105.2.1			X		
Mandatory	Storm water pollution prevention for projects that disturb less than 1 acre of land	5.106.1 through 5.106.2			X		
Mandatory	Short-term bicycle parking (with exception)	5.106.4.1.1			X		
Mandatory	Long-term bicycle parking	5.106.4.1.2 through 5.106.4.1.5			X		
Mandatory	Electric vehicle (EV) charging [N] with Section 5.106.3.1, 5.106.5.3.2 and associated Table 5.106.5.3.1	5.106.5.3.1, 5.106.5.3.2, Table 5.106.5.3.1, 5.106.5.3.2.1, 5.106.5.3.2.2, 5.106.5.3.3, 5.106.5.3.4 and 5.106.5.3.5.			X		No additional parking was provided

Requirement	SECTION TITLE	CODE SECTION	Y	N	N/A	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
	OR Power Allocation Method: Section 5.106.5.3.6 and associated Table 5.106.5.3.6	OR 5.106.5.3.6, Table 5.106.5.3.6 5.106.5.3.3, 5.106.5.3.4 and 5.106.5.3.5					
Mandatory	Additions or Alterations to existing buildings or parking facilities [A] with Exceptions	5.106.5.4	X				See C-1 for additional building layout, Electrical Sheet: E-4 & E-11
Mandatory	Existing buildings or parking areas without previously installed EV capable infrastructure [A].	5.106.5.4.1	X				Electrical Sheet: E-4 & E-11. No additions/alterations to existing parking facilities.
Mandatory	Existing buildings or parking areas with previously installed EV capable infrastructure [A].	5.106.5.4.2			X		
Mandatory	Electric vehicle (EV) charging: medium-duty and heavy-duty [N]	5.106.5.5			X		
Mandatory	Electric vehicle charging readiness requirements for warehouses, grocery stores and retail stores with planned off-street loading spaces [N]	5.106.5.5.1			X		
Mandatory	TABLE 5.106.5.5.1	5.106.5.5 and 5.106.5.5.1			X		
Mandatory	Light pollution reduction [N] (with exceptions, notes and table)	5.106.8 through 5.106.8.2			X		No outdoor lighting being added.
Mandatory	Grading and paving (exception for additions and alterations not altering the drainage path)	5.106.10			X		New building addition has no impact on existing site drainage path.

DIVISION 5.2 Energy Efficiency

Requirement	SECTION TITLE	CODE SECTION	Y	N	N/A	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
Mandatory	Meet the minimum energy efficiency standard	5.201.1	X				Sheet G-1.4

DIVISION 5.3 Water Efficiency and Conservation

Requirement	SECTION TITLE	CODE SECTION	Y	N	N/A	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
Mandatory	Separate meters (new buildings or additions > 50,000 sfthat consume more than 100 gal/day)	5.303.1.1	X				Detail "A" on sheet P-8
Mandatory	Separate meters (for tenants in new buildings or additions that consume more than 1,000 gal/day)	5.303.1.2			X		
Mandatory	Water closets shall not exceed 1.28 gallons per flush (gpf)	5.303.3.1	X				Spec 224213.13
Mandatory	Wall-mounted urinals shall not exceed 0.125 gpf	5.303.3.2.1			X		No urinals
Mandatory	Floor-mounted urinals shall not exceed 0.5 gpf	5.303.3.2.2			X		
Mandatory	Single showerhead shall have maximum flow rate of 1.8 gpm (gallons per minute) at 80 psi	5.303.3.3.1			X		No new showers
Mandatory	Multiple showerheads serving one shower shall have acombined flow rate of 1.8 gpm at 80 psi	5.303.3.3.2			X		
Mandatory	Nonresidential lavatory faucets	5.303.3.4.1	X				Spec 224216.13
Mandatory	Kitchen faucets	5.303.3.4.2			X		
Mandatory	Wash fountains	5.303.3.4.3			X		
Mandatory	Metering faucets	5.303.3.4.4			X		
Mandatory	Metering faucets for wash fountains	5.303.3.4.5			X		
Mandatory	Pre-rinse spray valve	5.303.3.4.6			X		
Mandatory	Food waste disposers	5.303.4.1			X		
Mandatory	Areas of additions or alterations	5.303.5	X				P-2, P-3, P-4, P-5
Mandatory	Standards for plumbing fixtures and fittings	5.303.6	X				P-3, P-4, P-5
Mandatory	Outdoor potable water use in landscape areas (with notes)	5.304.1			X		Using non-potable water

DIVISION 5.4 Material Conservation and Resource Efficiency

Requirement	SECTION TITLE	CODE SECTION	Y	N	N/A	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
Mandatory	Weather protection	5.407.1	X				Sheet A-1.1
Mandatory	Moisture control: sprinklers	5.407.2.1			X		Reroute irrigation piping around new building addition. No upgrade to existing irrigation system. See C-1 for new irrigation routing.
Mandatory	Moisture control: exterior door protection	5.407.2.2.1	X				Sheet A-1.1
Mandatory	Moisture control: flashing	5.407.2.2.2	X				Sheet A-8.2
Mandatory	Construction waste management—comply with either: Sections 5.408.1.1, 5.408.1.2, 5.408.1.3 or more stringent local ordinance	5.408.1.1, 5.408.1.2, 5.408.1.3	X				Spec 024119
Mandatory	Construction waste management: documentation	5.408.1.4	X				Spec 024119
Mandatory	Universal waste [A]	5.408.2	X				Spec 024119
Mandatory	Excavated soil and land clearing debris (100%	5.408.3			X		

Requirement	SECTION TITLE	CODE SECTION	Y	N	N/A	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
	reuse orrecycle) with Exception and Notes						

Requirement	SECTION TITLE	CODE SECTION	Y	N	N/A	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
Mandatory	Life Cycle Assessment, Scope, Whole building life cycle assessment with Notes, Building components, Reference study period, and Verification of compliance	5.409.1, 5.409.2, 5.409.2.1, 5.409.2.2 and 5.409.2.3			X		
Mandatory	Life Cycle Assessment, Scope, Product GWP compliance – prescriptive path, 5.409.3.1 with Exception and Exception EQUATION, Verification of compliance and Product GWP Limits Table with Footnotes	5.409.1, 5.409.3, 5.409.3.1, 5.409.3.2 and Table 5.409.3			X		
Mandatory	Recycling by occupants (with exception)	5.410.1	X				Administered by City of Redlands.
Mandatory	Recycling by occupants: additions (with exception)	5.410.1.1	X				Administered by City of Redlands
Mandatory	Recycling by occupants: sample ordinance	5.410.1.2	X				Existing - administered by City of Redlands
Mandatory	Commissioning new buildings (≥ 10,000 sf) [N]	5.410.2			X		
Mandatory	Owner's or owner representative's Project Requirements (OPR) [N]	5.410.2.1			X		
Mandatory	Basis of Design (BOD) [N]	5.410.2.2			X		
Mandatory	Commissioning plan [N]	5.410.2.3			X		
Mandatory	Functional performance testing [N]	5.410.2.4			X		
Mandatory	Documentation and training [N]	5.410.2.5			X		
Mandatory	Systems manual [N]	5.410.2.5.1			X		
Mandatory	Systems operation training [N]	5.410.2.5.2			X		
Mandatory	Commissioning report [N]	5.410.2.6			X		
Mandatory	Testing and adjusting for new buildings < 10,000 sf ornew systems that serve additions or alterations [A]	5.410.4			X		
Mandatory	System testing plan for renewable energy, landscapeirrigation and water reuse [A]	5.410.4.2			X		
Mandatory	Procedures for testing and adjusting	5.410.4.3			X		
Mandatory	Procedures for HVAC balancing	5.410.4.3.1			X		
Mandatory	Reporting for testing and adjusting	5.410.4.4			X		
Mandatory	Operation and maintenance (O&M) manual	5.410.4.5			X		
Mandatory	Inspection and reports	5.410.4.5.1			X		

DIVISION 5.5 Environmental Quality

Requirement	SECTION TITLE	CODE SECTION	Y	N	N/A	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
Mandatory	Fireplaces	5.503.1			X		
Mandatory	Woodstoves	5.503.1.1			X		
Mandatory	Temporary ventilation	5.504.1			X		
Mandatory	Covering of ducts openings and protection of mechanical equipment during construction	5.504.3	X				Spec 233113 Spec 237416
Mandatory	Adhesives, sealants, and caulks	5.504.4.1	X				Spec 079200
Mandatory	Paints and coatings	5.504.4.3	X				Spec 099113 Spec 099123

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT — RICHARD D. CHONG — NO. C 8171 — REN. 08/30/27 — STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

CALGREEN MANDATORY CHECKLIST 1

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 6 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

G-1.6

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Requirement	SECTION TITLE	CODE SECTION	Y	N	N/A	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
Mandatory	Aerosol paints and coatings	5.504.4.3.1			X		
Mandatory	Aerosol paints and coatings: verification	5.504.4.3.2			X		
Mandatory	Carpet systems	5.504.4.4			X		
Mandatory	Carpet cushion	5.504.4.4.1			X		
Mandatory	Carpet adhesives per Table 5.504.4.1	5.504.4.4.2			X		
Mandatory	Composite wood products	5.504.4.5			X		
Mandatory	Composite wood products: documentation	5.504.4.5.3			X		
Mandatory	Resilient flooring systems	5.504.4.6	X				Spec 096519
Mandatory	Resilient flooring: verification of compliance	5.504.4.6.1	X				Spec 096519
Mandatory	Thermal insulation	5.504.4.7	X				Spec 072100
Mandatory	Verification of compliance	5.504.4.7.1	X				Spec 072100
Mandatory	Acoustical ceilings and wall panels	5.504.4.8	X				Spec 095123
Mandatory	Verification of compliance	5.504.4.8.1	X				Spec 095123
Mandatory	Filters (with exceptions)	5.504.5.3	X				Sheet M-10
Mandatory	Filters: labeling	5.504.5.3.1	X				Sheet M-10 Spec 230553
Mandatory	Environmental tobacco smoke (ETS) control	5.504.7			X		
Mandatory	Indoor moisture control	5.505.1	X				Title 24 Forms on drawings M-12 to M-16
Mandatory	Outside air delivery	5.506.1	X				SHEET M-10 Title 24 Forms on drawings M-12 to M-16
Mandatory	Carbon dioxide (CO_2) monitoring	5.506.2			X		
Mandatory	Acoustical control (with exception)	5.507.4			X		
Mandatory	Exterior noise transmission,	5.507.4.1			X		

Requirement	SECTION TITLE	CODE SECTION	Y	N	N/A	O	PLAN SHEET, SPEC, OR ATTACH REFERENCE
	prescriptive method (with exceptions)						
Mandatory	Noise exposure where noise contours are not readily available	5.507.4.1.1			X		
Mandatory	Performance method	5.507.4.2			X		
Mandatory	Site features	5.507.4.2.1			X		
Mandatory	Documentation of compliance	5.507.4.2.2			X		
Mandatory	Interior sound transmission (with note)	5.507.4.3			X		
Mandatory	Ozone depletion and greenhouse gas reductions	5.508.1	X				Sheet M-10 (Air Handling Units Schedule)
Mandatory	Chlorofluorocarbons (CFCs)	5.508.1.1			X		Not Used
Mandatory	Halons	5.508.1.2			X		Not Used
Mandatory	Supermarket refrigerant leak reduction for retail food stores 8,000 square feet or more	5.508.2 through 5.508.2.6.3			X		
	END OF MANDATORY PROVISIONS						

Documentation Author's / Responsible Designer's Declaration Statement

☒ **Mandatory:** I attest that this mandatory provisions checklist is accurate and complete.

Signature:

Company: CDM Smith	Date:
Address: 32 Discovery Suite 250	License: 8171
City/State/Zip: Irvine/ CA / 92618	Phone:

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel. (213) 457-2200

5-14-2025

LICENSED ARCHITECT
RICHARD D. CHONG
NO. C 8171
REN. 08/30/27
STATE OF CALIFORNIA

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

CALGREEN MANDATORY CHECKLIST 2

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

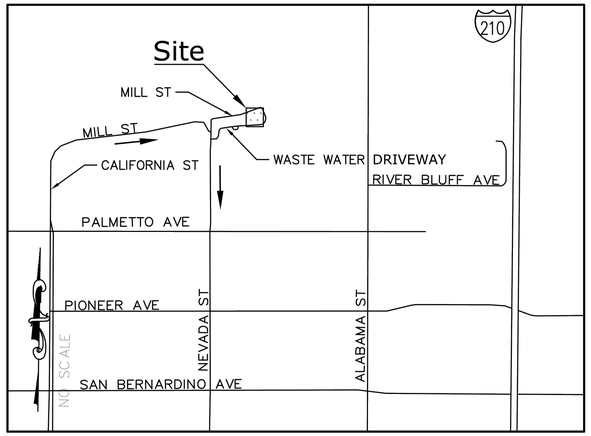
REVIEWED BY:
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 — DATE 6/11/2025

APPROVED BY:
Goutam K. Dobey, City Engineer, RCE 75646 — DATE 6/11/2025

Sheet 7 of 126 Sheets
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Vert. AS SHOWN

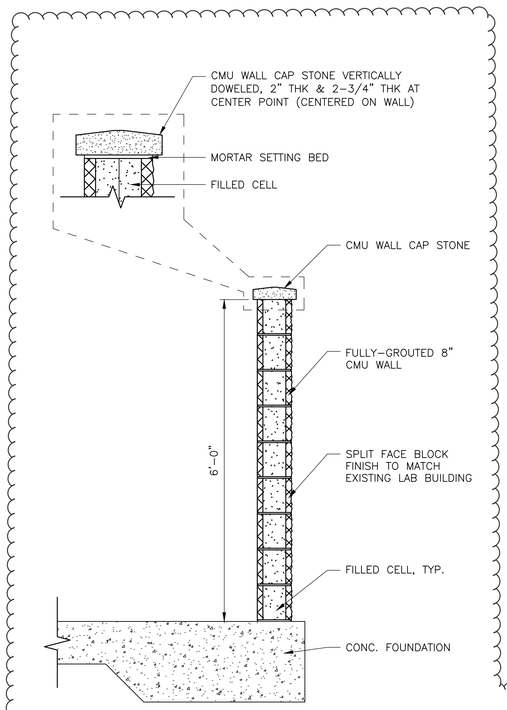
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VICINITY MAP

NTS



TRASH ENCLOSURE WALL AND GATE FINISHES SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND FINAL APPROVAL PRIOR TO FABRICATION AND INSTALLATION.

DUMPSTER WALL SECTION

DETAIL A

NTS



SITE ACCESS AND CONSTRUCTION STAGING AREA

PLAN

NTS

NOTES:

1. EXISTING EMPLOYEE PARKING LOT LOCATE EAST OF THE EXISTING LAB BUILDING TO BE USED BY CONTRACTOR FOR CONSTRUCTION ACCESS AND TEMPORARY PARKING DURING CONSTRUCTION. CONTRACTOR TO COORDINATE WITH THE CITY FOR ITS AVAILABILITY AND TIMELINE.
2. INSTALL NEW AC PAVEMENT PER SECTION 302-5 OF CITY OF REDLANDS STANDARD SPECIFICATIONS AND DETAIL DRAWINGS FOR DESIGN AND CONSTRUCTION OF PUBLIC IMPROVEMENTS, JANUARY 2023 EDITION.

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R=13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	8/15	M. MA	M. RUSH

Revisions

CDM Smith
600 Wilshire Blvd #750
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER — No. 70319 — CIVIL — STATE OF CALIFORNIA

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT
PROJECT No. 521028
SITE ACCESS AND CONSTRUCTION STAGING AREA

Designed by: M. MA
Date: MAY 2025
Checked by: B. LETO
Date: MAY 2025
Drawn by: W. TALBOT
Date: MAY 2025
Checked by: M. MA
Date: MAY 2025

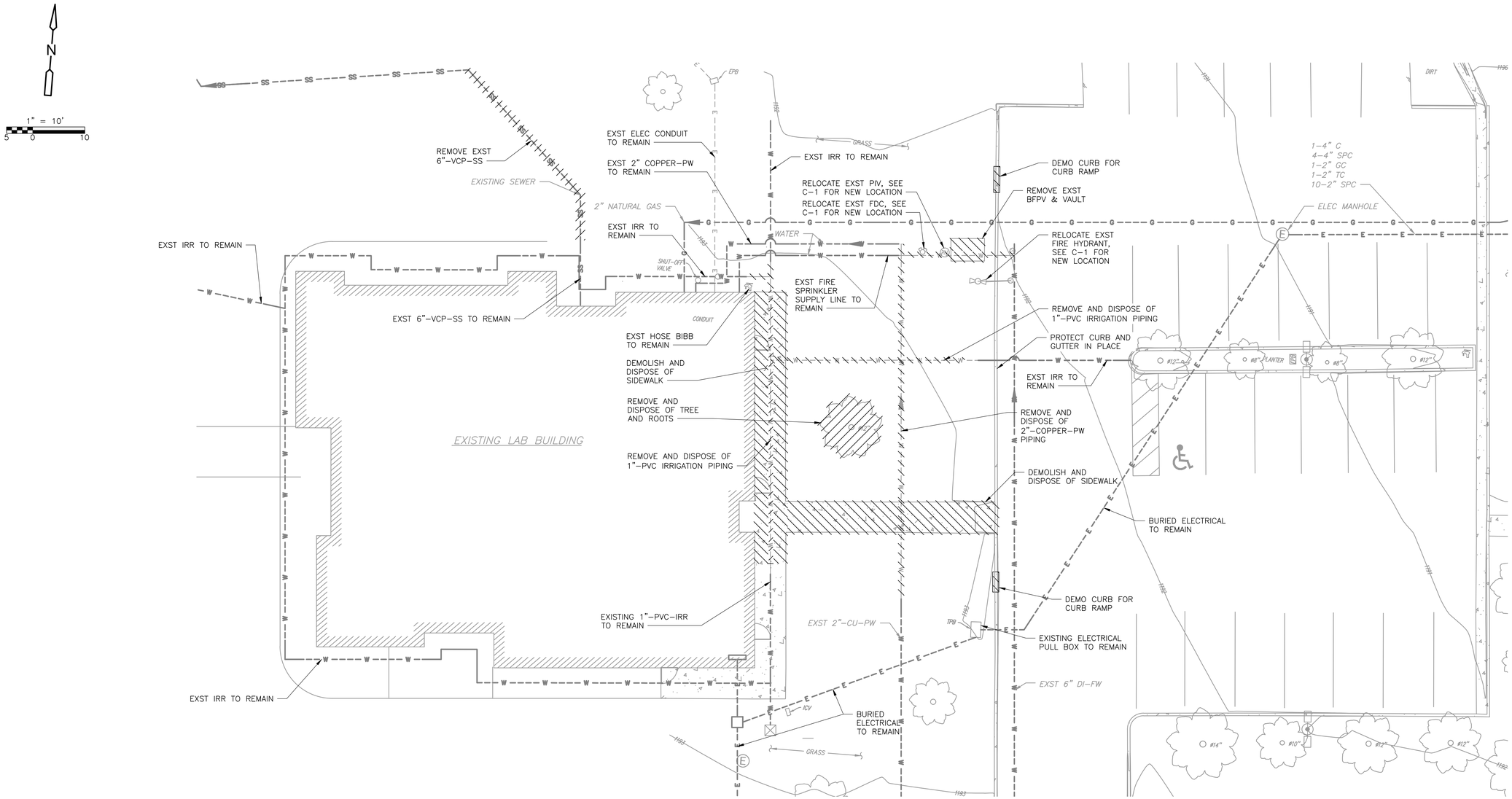
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 8 of 126 Sheets
Scale Horiz. X
Vert. X

GC-1

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SITE

PLAN

1" = 10'

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Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER — No. 70319 — CIVIL — STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

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Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT PROJECT No. 521028

CIVIL DEMOLITION PLAN

Designed by: M. MA
Date: MAY 2025
Checked by: B. LETO
Date: MAY 2025
Drawn by: W. TALBOT
Date: MAY 2025
Checked by: M. MA
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, R.C.E. 75646 DATE

Sheet 9 of 126 Sheets
Scale Horiz. X
Vert. X

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N

1" = 10'
5 0 10

SMH
RIM 1186.50
INV 1182.40
INV~1182.50 IN (EXST 6" VCP)
INV~1182.30 OUT (EXST 6" VCP)
INV 1183.00 IN (6" PVC)
INV 1183.00 IN (6" PVC)
A / C-2

6"-VCP-SS

1"X1"X1" TEE CONNECT TO EXISTING IRRIGATION PIPE INV ~1192.1

6"-PVC-SS

6"x6"x6" WYE

EXST ELEC CONDUIT TO REMAIN

2"-DI-PW CONNECT TO EXST 2"-CU-PW INV ~1189.0 SEE NOTE 2

CONC ENCASEMENT, SEE NOTE 7

RELOCATED FDC

RELOCATED FIRE HYDRANT

B / C-2 ADA ACCESS RAMP

NEW SIDEWALK

EXST GAS LINE TO REMAIN

4"-PVC-FD

6"-PVC-SS, SEE NOTE 4

SEE SHEET M-4 & NOTE 8

HVAC SLAB PAD: 1193.00

CLEANOUT

INV 1184.64

INV 1184.65

BFPV (ABOVE GRADE) SEE SHEET FP-2

RELOCATED PIV

6"-DI-FW

PAD: 1193.00

2" NATURAL GAS

1-4" C
4-4" SPC
1-2" GC
1-2" TC
10-2" SPC

ELEC MANHOLE

6"x6"x2" DI TEE, SEE NOTE 1

1"-PVC-IRRIGATION

NON-POTABLE WATER

TIE-IN TO EXST 6" VCP

EXST IRR LINE TO REMAIN

6" 90° BEND INV ~1187.1 SEE NOTE 3

REROUTE 2"-DI-PW

EXST 2"-CU-PW TO REMAIN

EXST FIRE SPRINKLER SUPPLY LINE TO REMAIN

PLANT NATIVE LOW MAINTENANCE BUSHES

1"-PVC-IRR (IRRIGATION) CONNECT TO EXISTING IRRIGATION PIPE INV ~1191.8

LIMIT OF EXCAVATION PROTECT EXST CURB AND GUTTER IN-PLACE, SEE NOTE 6

1"x1"x1" tee CONNECT TO EXISTING IRRIGATION PIPE INV ~1191.5

1"-PVC-IRR

EXST 6"-DI-FW TO REMAIN

EXISTING LAB BUILDING

PROPOSED ADDITION

6'

RESTORE TURF FOLLOWING CONSTRUCTION

B / C-2 ADA ACCESS RAMP

EMPLOYEE PARKING LOT
(28 SPACES)

ADA ACCESS ROUTE

VISITOR PARKING LOT
(11 SPACES)

TOTAL 39 PARKING SPACES, SEE GC-1 FOR OVERALL PARKING LAYOUT

1"-PVC-IRR CONNECT TO EXISTING IRRIGATION PIPE INV ~1192.3

6' SIDEWALK

REROUTE 2" CU-PW TO EXISTING 2" CU-PW INV ~1190.8

BURIED ELECTRICAL

EXISTING BURIED ELECTRICAL TO REMAIN

6"-DI-PW

ICV

IRRIGATION BACKFLOW DEVICE

GRASS

2"-COPPER-PW

ELECTRICAL DUCT BANK SEE SHEET E-4

HH-1

PLANTER

1"-PVC IRRIGATION

ADA ACCESS ROUTE

PULL BOX

BURIED ELECTRICAL

BFV

WM

DIRT

CONSTRUCTION NOTES:

1. INSTALL 6"X6"X2" TEE AND 2" DUCTILE IRON PIPE. NEW POTABLE WATER PIPE SHALL CROSS ON TOP OF THE NEW SEWER PIPE WITH MINIMUM 18" CLEARANCE.
2. CONNECT EXISTING 2" COPPER POTABLE WATER TO THE NEW 2" DUCTILE IRON PIPE WITH TRANSITION COUPLING. CONCRETE ENCASE POINT OF CONNECTION OF THE 2" DUCTILE IRON PIPE AND EXISTING COPPER PIPE WITHIN 10 FEET TO THE SEWER CROSSING
3. INSTALL 6" DUCTILE IRON 90 DEGREE BEND AND CONNECT TO EXISTING 6" DUCTILE IRON PIPE WITH MECHANICAL JOINT. SEE DETAIL C/C-2.
4. PVC SEWER PIPE AND FITTINGS SHALL CONFORM TO AMERICAN SOCIETY FOR TESTING AND MATERIALS (A.S.T.M.) DESIGNATION D-3034, 15" MAXIMUM SIZE, SDR 35 LATEST REVISION.
5. PROVIDE MINIMUM 2% SLOPE AWAY FROM EDGE OF THE BUILDING FOR FINISH GRADE ALONG THE PERIMETER OF THE BUILDING.
6. LIMIT OF EXCAVATION IS 6FT FROM EDGE OF THE BUILDING, PROTECT EXISTING UTILITIES TO REMAIN IN-PLACE WITHIN THE EXCAVATION ZONE WITH TEMPORARY PIPE SUPPORT AS-NEEDED.
7. CONCRETE ENCASE POTABLE WATER PIPES WITH CONNECTIONS WITHIN 5 FEET LIMIT TO THE SEWER PIPES.
8. PAD ELEVATION IS ESTIMATED PER ELEVATION SHOWN ON AS-BUILT RECORD DATED 1987 WITH 2.618 FEET ADJUSTMENT FROM THE NGVD 29 DATUM. CONTRACTOR TO FIELD VERIFY ACTUAL FINISH GRADE AT THIS LOCATION TO SET PAD ELEVATION AT LEAST 6 INCH ABOVE ADJACENT FINISH GRADE PER DETAIL A/SD-2. PATCH THE EDGE OF THE SLAB WITH LESS THAN 3:1 SLOPE TO PROVIDE SMOOTH TRANSITION TO ADJACENT GRADE AT THE SIDE WITH LOWER ELEVATIONS.
9. INVERT ELEVATION OF THE EXISTING PIPING IS ESTIMATED PER AS-BUILT RECORD WITH NGVD 29 DATUM. CONTRACTOR TO FIELD VERIFY EXISTING PIPE SIZE AND ELEVATION PRIOR TO PIPE INSTALLATION.

SITE PLAN
1" = 10'

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
	Revisions			

CDM Smith
600 Wilshire Blvd #750
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER
MARK A. OCHOA
NO. 70319
CIVIL
STATE OF CALIFORNIA

5-14-2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT
PROJECT No. 521028

SITE PLAN

Designed by: M. MA
Date: MAY 2025
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Date: MAY 2925
Drawn by: W. TALBOT
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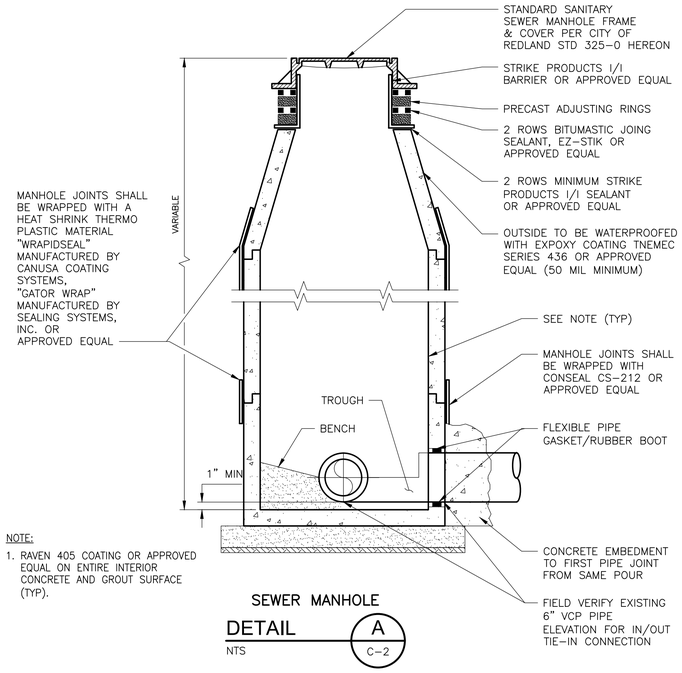
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, R.C.E. 75646 DATE

Sheet 10 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. NA

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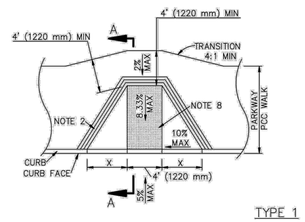


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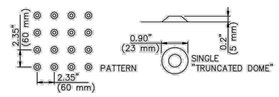
1. RAVEN 405 COATING OR APPROVED EQUAL ON ENTIRE INTERIOR CONCRETE AND GROUT SURFACE (TYP).

SEWER MANHOLE

DETAIL A — NTS — C-2



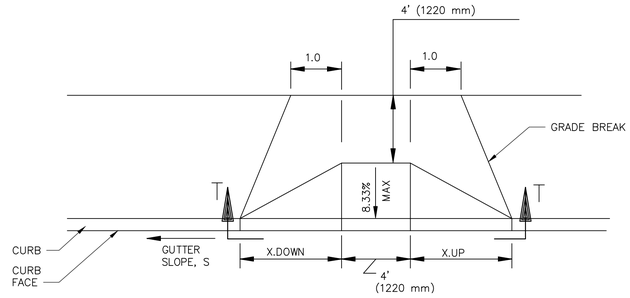
TYPE 1



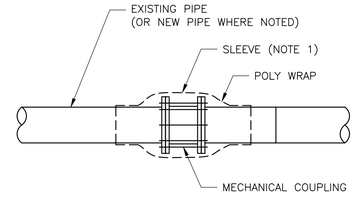
DETECTABLE WARNING DETAIL

CURB RAMP

DETAIL B — NTS — C-2



TYPICAL CURB RAMP

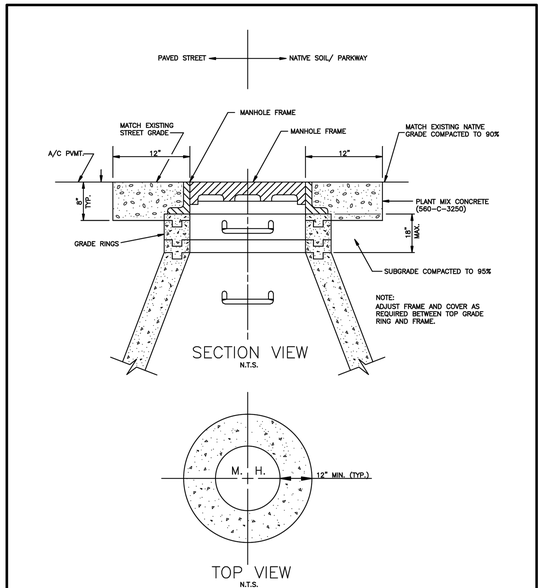


NOTES:

1. MECHANICAL (FLEX) COUPLING, MIN SLEEVE LENGTH SHALL BE:
   7" FOR PIPE DIA ≤12" PIPE,
   10" FOR PIPE DIA 14" TO 36" PIPE,
   18" FOR PIPE DIA >36" PIPE.
2. PROVIDE ISOLATION BOOT/BONDING WHERE NOTED.
3. PROVIDE TRANSITION COUPLING WHERE CONNECTING PIPE W/ DIFFERENT OUTSIDE DIMENSIONS.

TYPICAL MECHANICAL COUPLING

DETAIL C — NTS — C-2



CITY OF REDLANDS MUNICIPAL UTILITIES AND ENGINEERING DEPARTMENT

REV.	BY	DATE	MANHOLE AT GRADE DETAIL	STD. DWG. NUMBER 325-0
			APPROVED: Goutam K. Dobey, Engineering Manager RCE 75646 — DATE: 02/20/2020	SHEET 1 OF 1

NOTES

1. SEE STD. DWG. NUMBER 190 FOR TRENCH REPAIR GENERAL NOTES.
2. ALL TRENCH REPAIR SHALL BE COMPLETED PER STD. DWG. 191 UNLESS THIS REPAIR DETAIL IS EXPLICITLY APPROVED IN WRITING AS AUTHORIZED BY THE CITY ENGINEER.

CITY OF REDLANDS MUNICIPAL UTILITIES AND ENGINEERING DEPARTMENT

REV.	BY	DATE	BUTT JOINT TRENCH REPAIR	STD. DWG. NUMBER 192
			APPROVED: — DATE: 01/03/2023 — GOUTAM K. DOBEY, CITY ENGINEER, RCE 75646	SHEET 1 OF 1

TRENCH REPAIR GENERAL NOTES

1. ALL PAVEMENT REPAIR WORK SHALL CONFORM TO THE GENERAL PERMIT CONDITIONS AND TRENCH SPECIFICATIONS, 2018 GREENBOOK AND ANY ADDITIONAL REQUIREMENTS LISTED WITHIN THE PLANS OR PERMIT.
2. ALL TRENCH ACTIVITY SHALL BE REPAIRED WITH A T-CUT REPAIR AS SHOWN ON STD. DWG. NUMBER 191. A BUTT JOINT TRENCH REPAIR, PER STD. DWG. NUMBER 192, SHALL ONLY BE USED WHEN APPROVED IN WRITING BY THE CITY ENGINEER.
3. THERE SHALL BE NO TRENCHING ACTIVITY ON STREETS PAVED OR RESURFACED WITHIN THE PREVIOUS 5 YEARS UNLESS OTHERWISE AUTHORIZED BY THE CITY ENGINEER, SEE SECTION 6.3 OF GENERAL PERMIT CONDITIONS AND TRENCH SPECIFICATIONS, LATEST EDITION.
4. IN THE EVENT TRENCHING IS AUTHORIZED FOR A MORATORIUM STREET, THE OVERLAY AREA WILL BE DETERMINED BY STD. DWG. NUMBER 193.
5. WHEN "EXCESSIVE PAVEMENT REMOVAL" OCCURS, AS DEFINED BY SECTION 8.5 OF THE GENERAL PERMIT CONDITIONS AND TRENCH SPECIFICATIONS, LATEST EDITION, THE OVERLAY AREA WILL BE DETERMINED BY STD. DWG. NUMBER 193.
6. PRIOR TO THE PAVEMENT REPAIR, SAWCUT A CLEAN, STRAIGHT, VERTICAL FACE AT 12" MINIMUM BEYOND THE EDGE OF THE REQUIRED TRENCH WIDTH. ALL LIQUIDS GENERATED BY SAWCUTTING SHALL BE CAPTURED AND DISPOSED OF ACCORDINGLY.
7. A MINIMUM OF 2" OF TEMPORARY ASPHALT PAVEMENT SHALL BE INSTALLED WITHIN THE TRENCH AREA. TEMPORARY PAVING SHALL BE FLUSH WITH SURROUNDING GRADE AND MAINTAINED UNTIL PERMANENT ASPHALT IS INSTALLED.
8. BASE COURSE SHALL BE "B PG 64-10" SHALL BE COMPLETED IN LIFTS BETWEEN 2" AND 3" AND COMPACTED TO 95% RELATIVE COMPACTION.
9. FINISH COURSE SHALL BE "C2 PG 64-10" OR "D1 PG 64-10" (1/2" OR 3/8"), DEPENDING ON OVERLAY THICKNESS, PER STD. DWG. 191 AND COMPACTED TO 95% RELATIVE COMPACTION.
10. BASE PAVEMENT SHALL BE INSTALLED FLUSH WITH THE SURROUNDING GRADE AND GRINDED DOWN TO THE THICKNESS OF THE OVERLAY WHEN THE FINISH COURSE OVERLAY IS INSTALLED.
11. A MINIMUM OF 72 HOURS SHALL PASS BETWEEN THE INSTALLATION OF THE BASE COURSE TO THE INSTALLATION OF THE FINISH COURSE. NOTIFY THE INSPECTOR AT THE START OF THE 72 HOURS TO ALLOW TIME FOR INSPECTION PRIOR TO THE INSTALLATION OF THE FINISH COURSE.
12. APPLY A TACK COAT TO ALL VERTICAL EDGES AND SURFACES TO BE CAPPED.
13. APPLY A SEAL COAT AND #30 SILICA SAND TO FINISHED EDGES USING SS1H ASPHALT EMULSION.
14. ALL PAVEMENT REPAIR SHALL BE COMPLETED WITH LIKE MATERIALS, I.E. ARHM SHALL BE REPLACED WITH ARHM.
15. TRAFFIC CONTROL SHALL REMAIN IN PLACE UNTIL THE NEW PAVEMENT IS ALLOWED TO COOL TO A POINT THAT IT CAN SUSTAIN MOTOR VEHICLES WITHOUT DAMAGING THE FINISHED SURFACE. ANY TRACKING SHALL BE CORRECTED BY THE CONTRACTOR IN CONFORMANCE WITH THE REDBOOK.
16. ALL UNDERGROUND SERVICE ALERT (USA) MARKINGS SHALL BE REMOVED BY THE CONTRACTOR OR PERMIT HOLDER IN ACCORDANCE WITH SECTION 3.5 OF THE GENERAL PERMIT CONDITIONS AND TRENCH SPECIFICATIONS.

CITY OF REDLANDS MUNICIPAL UTILITIES AND ENGINEERING DEPARTMENT

REV.	BY	DATE	TRENCH REPAIR GENERAL NOTES	STD. DWG. NUMBER 190
			APPROVED: — DATE: 01/03/2023 — GOUTAM K. DOBEY, CITY ENGINEER, RCE 75646	SHEET 1 OF 1

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R=13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
	Revisions			

CDM Smith
600 Wilshire Blvd #750
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER — SYLVIA OCHOTORENA — NO. 70319 — CIVIL — STATE OF CALIFORNIA

5-14-2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT
PROJECT No. 521028

CIVIL DETAILS

Designed by: M. MA — Date: MAY 2025
Checked by: B. LETO — Date: MAY 2025
Drawn by: W. TALBOT — Date: MAY 2025
Checked by: M. MA — Date: MAY 2025

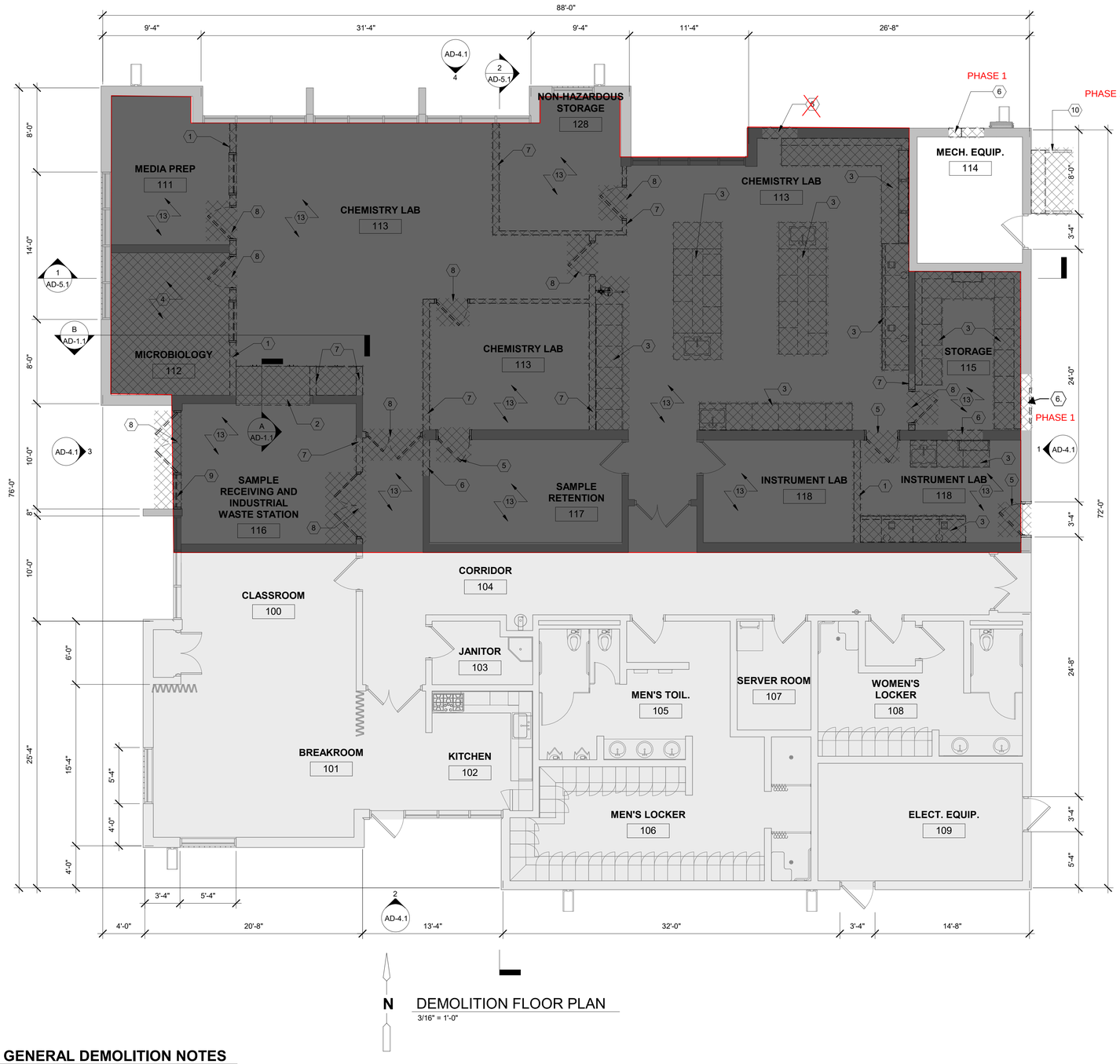
REVIEWED BY: Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 — 6/11/2025 — DATE
APPROVED BY: Goutam K. Dobey, City Engineer, R.C.E. 75646 — 6/11/2025 — DATE

Sheet 11 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. NA

C-2

WW-00007

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DEMOLITION FLOOR PLAN

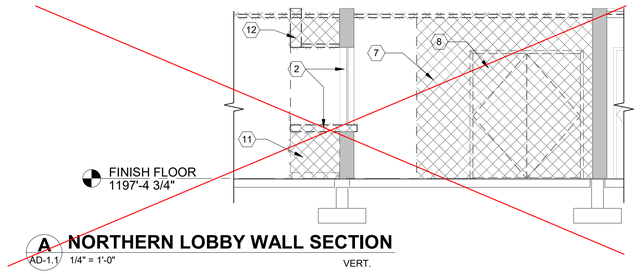
3/16" = 1'-0"

DEMOLITION KEYNOTES:

1. ~~WHEN DEMOLISHING STEM WALLS, CHIP DOWN 4" BELOW EXISTING CONCRETE SLAB TO CREATE A SMOOTH LEVEL SURFACE READY TO RECEIVE THE SCHEDULED FLOORING.~~
2. ~~REMOVE GLASS, COUNTERTOP, AND TRIM. INFILL WALL, USE METAL STUD WITH GYP FINISH TO MATCH ADJACENT WALL FINISH.~~
3. ~~REMOVE EXISTING CABINETS AND LAB EQUIPMENT. EXERCISE CARE ON THE REMOVAL OF THE EQUIPMENT TO BE SALVAGED FOR RE-INSTALLATION. RELOCATE UTILITIES AS REQUIRED.~~
4. ~~DEMOLISH EXISTING RAISED ACCESSIBLE FLOOR AND SUPPORTS. REFER TO STRUCTURAL DRAWINGS FOR MODIFICIATION AND EXTENT OF INFILL TO CREATE A SMOOTH, LEVEL SURFACE READY TO RECEIVE THE SCHEDULED FLOORING.~~
5. ~~REMOVE EXISTING DOOR AND FRAME. REPLACE EXISTING WALL AND FLOOR COMPONENTS DAMAGED DURING DEMOLITION. INFILL WALL, MATCH EXISTING ADJACENT WALL FINISH.~~
6. DEMOLISH PORTION OF THE EXISTING WALL. PREPARE WALL OPENING READY TO RECEIVE NEW DOOR AND FRAME.
7. ~~DEMOLISH PORTION OF THE EXISTING WALL AND EXERCISE CARE IN RELOCATING EXISTING BUILDING UTILITIES INSIDE THE WALL AS REQUIRED TO KEEP THEM FUNCTIONAL. PATCH AND REPAIR AS REQUIRED. REPLACE EXISTING WALL AND FLOOR COMPONENTS DAMAGED DURING DEMOLITION.~~
8. ~~REMOVE EXISTING DOOR AND FRAME. REPLACE EXISTING WALL AND FLOOR COMPONENTS DAMAGED DURING DEMOLITION.~~
9. ~~REMOVE STOREFRONT WINDOW. INFILL WALL AS NOTED ON THE ARCHITECTURAL DRAWINGS. REPLACE EXISTING WALL AND FLOOR COMPONENTS DAMAGED DURING DEMOLITION.~~
10. RELOCATE TANK STORAGE TO WEST OF DOOR DA-102.
11. ~~SALVAGE FURNITURE FOR REINSTALLATION IN NEW OFFICE BUILDING.~~
12. ~~DEMOLISH SOFFIT, AND EXERCISE CARE IN RELOCATING EXISTING BUILDING UTILITIES INSIDE THE WALL AS REQUIRED TO KEEP THEM FUNCTIONAL. CONCRETE BLOCK WALL BEHIND SOFFIT TO REMAIN, REPLACE EXISTING WALL COMPONENTS DAMAGED DURING DEMOLITION.~~
13. ~~REMOVE ALL EXISTING FLOOR FINISHES THROUGHOUT THE ROOM, INCLUDING WALL BASE, ADHESIVES, AND UNDERLAYMENTS. PREPARE THE ENTIRE SLAB AND ADJACENT SURFACES TO RECEIVE NEW FINISHES.~~

DEMOLITION LEGEND

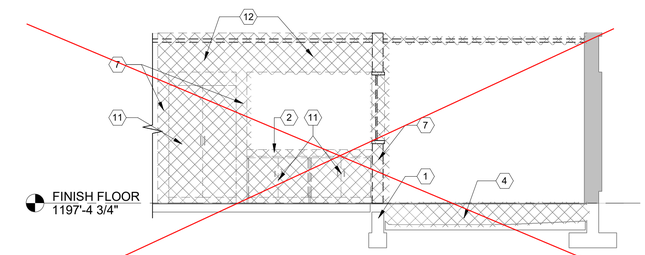
- TO BE DEMOLISHED
- EXISTING, TO REMAIN
- NO ARCHITECTURAL SCOPE
- NOT IN SCOPE



A AD-1.1 NORTHERN LOBBY WALL SECTION

1/4" = 1'-0"

VERT.



B AD-1.1 ACCESSIBLE FLOOR SECTION

1/4" = 1'-0"

VERT.

GENERAL DEMOLITION NOTES

1. COMPLY WITH APPLICABLE LOCAL, STATE AND FEDERAL CODES AND REGULATIONS PERTAINING TO SAFETY OF PERSONS, PROPERTY AND ENVIRONMENTAL PROTECTION.
2. ERECT AND MAINTAIN DUST PROOF PARTITIONS AS REQUIRED TO PREVENT SPREAD OF DUST, FUMES, AND SMOKE, ETC. TO OTHER PARTS OF THE BUILDING. ON COMPLETION, REMOVE PARTITIONS AND REPAIR DAMAGED SURFACES TO MATCH ADJACENT SURFACES.
3. IF DEMOLITION IS PERFORMED IN EXCESS OF THAT REQUIRED, RESTORE AFFECTED AREAS.
4. REMOVE FROM SITE DAILY AND LEGALLY DISPOSE OF REFUSE, DEBRIS, RUBBISH, AND OTHER MATERIALS RESULTING FROM DEMOLITION OPERATIONS.
5. REPLACE EXISTING TO REMAIN BUILDING COMPONENTS DAMAGED DURING DEMOLITION WORKS.
6. DEMOLITION WORK NOT SPECIFICALLY SHOWN BUT NECESSARY TO COMPLETE NEW WORK SHALL BE REQUIRED BY THE CONTRACTOR PERFORMING THE NEW WORK. EACH CONTRACTOR SHALL BE THOROUGHLY FAMILIAR WITH THE BUILDING SITE CONDITIONS AND SHALL MAKE ALLOWANCES TO INCLUDE ALL ITEMS OF DEMOLITION NOTED OR REASONABLY IMPLIED.
7. LOCATION OF EXISTING UTILITIES, STRUCTURE AND OTHER CONDITIONS SHOWN ON PLANS ARE APPROXIMATE. IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY AND REPORT ANY DISCREPANCIES TO THE ARCHITECT PRIOR TO STARTING THE WORK. MECHANICAL, PLUMBING AND ELECTRICAL ITEMS SHOWN ON ARCHITECTURAL PLANS ARE FOR COORDINATION ONLY. REFER TO ACTUAL MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS FOR ALL FIXTURES AND EQUIPMENT FOR EACH RESPECTIVE TRADE.
8. GENERAL CONTRACTOR SHALL REMOVE ALL LOOSE FURNITURE THROUGHOUT WORK AREAS. COORDINATE WITH OWNER AS TO WHAT SHOULD BE SALVAGED SHALL BE DISPOSED OF BY G.C.
9. G.C. SHALL PATCH AND LEVEL ALL DAMAGED FLOOR AREAS (INCLUDING EXISTING EXPOSED CONCRETE FLOOR) AND PREPARE TO RECEIVE NEW FLOORING. IN ALL AREAS WHERE THE FLOOR IS UNEVEN, THE CONTRACTOR SHALL USE A SUITABLE LEVELING COMPOUND (ARDEX) TO RE-LEVEL THE SURFACE AND RECEIVE NEW FINISHED FLOORING.

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT
RICHARD D. CHONG
NO. C 8177
REN. 08/30/27
STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

DEMOLITION - FLOOR PLAN

Design by: TIM KING Date: MAY 2025
Checked by: RICHARD CHONG Date: MAY 2025
Drawn by: DANIEL ARTEAGA Date: MAY 2025
Checked by: VALERIA NORATO Date: MAY 2025

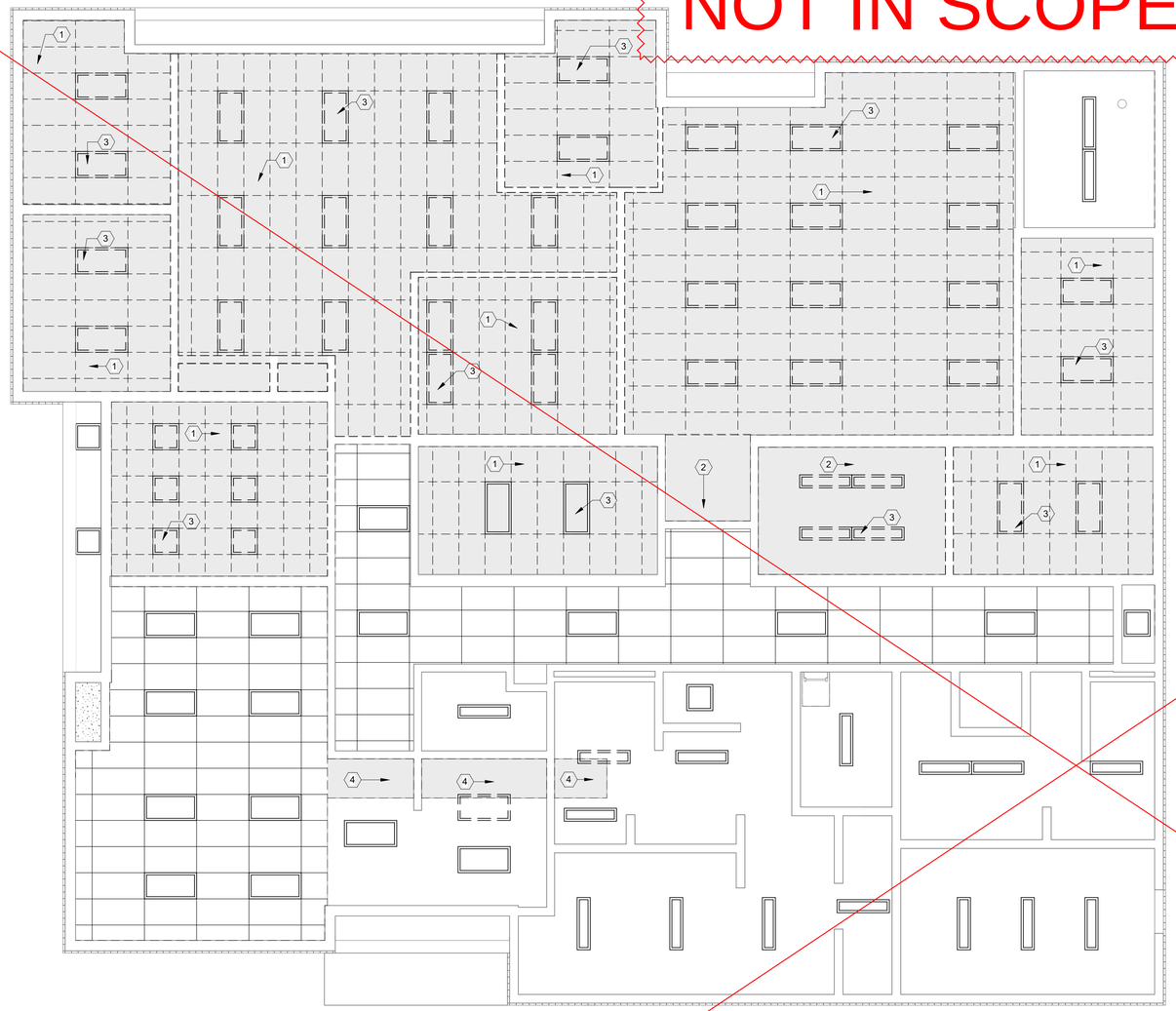
REVIEWED BY: Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 6/11/2025 DATE
APPROVED BY: Goutam K. Dobey, City Engineer, RCE 75646 6/11/2025 DATE

Sheet 12 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

AD-1.1

WW-00007

NOT IN SCOPE- PHASE 2



N

DEMOLITION - REFLECTED CEILING PLAN
3/16" = 1'-0"

DEMOLITION KEYNOTES:

1. REMOVE EXISTING ACOUSTICAL LAY-IN CEILING TILE SYSTEM.
2. REMOVE EXISTING GYPSUM BOARD CEILING SYSTEM.
3. REMOVE AND RELOCATE EXISTING LIGHT FIXTURE, TYP. SEE ELECTRICAL SHEETS.
4. PORTION OF EXISTING CEILING SHALL BE REMOVED IN THIS AREA TO ALLOW FOR THE INSTALLATION OF NEW EXHAUST DUCTWORK, SEE HVAC DRAWING M-4. EXTENT OF WORK TO BE FIELD VERIFIED AND COORDINATED WITH THE APPROVED EQUIPMENT.

REF. CLG. PLAN DEMOLITION LEGEND

- AREA OF WORK
- HIDDEN LINES DENOTE EXISTING CEILING TILES AND CEILING GRIDS ARE TO BE REMOVED.
- HALF-TONE CONTINUOUS LINES DENOTE EXISTING CEILING TILES AND CEILING GRIDS ARE TO REMAIN.
- LIGHT FIXTURES
- HVAC DIFFUSERS

GENERAL DEMOLITION NOTES

1. COMPLY WITH APPLICABLE LOCAL, STATE AND FEDERAL CODES AND REGULATIONS PERTAINING TO SAFETY OF PERSONS, PROPERTY AND ENVIRONMENTAL PROTECTION.
2. ERECT AND MAINTAIN DUST PROOF PARTITIONS AS REQUIRED TO PREVENT SPREAD OF DUST, FUMES, AND SMOKE, ETC. TO OTHER PARTS OF THE BUILDING. ON COMPLETION, REMOVE PARTITIONS AND REPAIR DAMAGED SURFACES TO MATCH ADJACENT SURFACES.
3. IF DEMOLITION IS PERFORMED IN EXCESS OF THAT REQUIRED, RESTORE AFFECTED AREAS.
4. REMOVE FROM SITE DAILY AND LEGALLY DISPOSE OF REFUSE, DEBRIS, RUBBISH, AND OTHER MATERIALS RESULTING FROM DEMOLITION OPERATIONS.
5. REPLACE EXISTING TO REMAIN BUILDING COMPONENTS DAMAGED DURING DEMOLITION WORKS.
6. DEMOLITION WORK NOT SPECIFICALLY SHOWN BUT NECESSARY TO COMPLETE NEW WORK SHALL BE REQUIRED BY THE CONTRACTOR PERFORMING THE NEW WORK. EACH CONTRACTOR SHALL BE THOROUGHLY FAMILIAR WITH THE BUILDING SITE CONDITIONS AND SHALL MAKE ALLOWANCES TO INCLUDE ALL ITEMS OF DEMOLITION NOTED OR REASONABLY IMPLIED.
7. LOCATION OF EXISTING UTILITIES, STRUCTURE AND OTHER CONDITIONS SHOWN ON PLANS ARE APPROXIMATE. IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY AND REPORT ANY DISCREPANCIES TO THE ARCHITECT PRIOR TO STARTING THE WORK. MECHANICAL, PLUMBING AND ELECTRICAL ITEMS SHOWN ON ARCHITECTURAL PLANS ARE FOR COORDINATION ONLY. REFER TO ACTUAL MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS FOR ALL FIXTURES AND EQUIPMENT FOR EACH RESPECTIVE TRADE.
8. EXISTING DIFFUSERS ARE TO BE RELOCATED, SEE MECHANICAL SHEETS.
9. THE BUILDING WILL BE OCCUPIED DURING RENOVATION. PROVIDE PROTECTION PARTICULARLY AT ENTRANCES AND EXITS OUT OF THE BUILDING.

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT
RICHARD D. CHONG
NO. 8177
REN: 08/30/27
STATE OF CALIFORNIA

5-14-2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

DEMOLITION - REFLECTED CEILING PLAN

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 13 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

AD-2.1

WW-00007



N

DEMOLITION ROOF PLAN
3/16" = 1'-0"

DEMOLITION KEYNOTES:

1. EXISTING ROOFING SYSTEM AND INSULATION TO BE DEMOLISHED AND REPLACED. REPLACE EXISTING PARAPET WALL, AND ROOF STRUCTURE DAMAGED DURING DEMOLITION.
2. ~~REMOVE SCREEN WALL PANEL FOR DUCT CONNECTION. COORDINATE WITH APPROVED MECHANICAL EQUIPMENT, SEE MECHANICAL.~~ NOT IN SCOPE.
3. WALKING PAD REPLACED AT TIME OF ROOFING REPLACEMENT.
4. ~~IN PHASE 2-A, REMOVE HVAC UNIT AND ALL RELATED CONTROLS AND ACCESSORIES. PATCH ROOF DECK AS WELL AS ROOF INSULATION AND MEMBRANE. CAP EXISTING MECHANICAL EQUIPMENT CURBS, SEE MECHANICAL.~~ NOT IN SCOPE.
5. ~~IN PHASE 2-A, REMOVE EXHAUST FAN AND ALL RELATED DUCTWORK AND ACCESSORIES. PATCH ROOF DECK AS WELL AS ROOF INSULATION AND MEMBRANE, SEE MECHANICAL.~~ NOT IN SCOPE.
6. ~~IN PHASE 2-B, REMOVE HVAC UNIT AND ALL RELATED CONTROLS AND ACCESSORIES. PATCH ROOF DECK AS WELL AS ROOF INSULATION AND MEMBRANE. CAP EXISTING MECHANICAL EQUIPMENT CURBS, SEE MECHANICAL.~~ NOT IN SCOPE.
7. ~~IN PHASE 2-B, REMOVE EXHAUST FAN AND ALL RELATED DUCTWORK AND ACCESSORIES. PATCH ROOF DECK AS WELL AS ROOF INSULATION AND MEMBRANE, SEE MECHANICAL.~~ NOT IN SCOPE.

GENERAL NOTES:

1. LOCATION SHOWN FOR EXISTING HVAC EQUIPMENT, ROOF HATCH AND OTHER EQUIPMENT AT THE ROOF IS APPROXIMATE. CONTRACTOR SHALL FIELD VERIFY ACTUAL LOCATIONS.
2. COMPLY WITH APPLICABLE LOCAL, STATE AND FEDERAL CODES AND REGULATIONS PERTAINING TO SAFETY OF PERSONS, PROPERTY AND ENVIRONMENTAL PROTECTION.
3. IF DEMOLITION IS PERFORMED IN EXCESS OF THAT REQUIRED, RESTORE AFFECTED AREAS.
4. REMOVE FROM SITE DAILY AND LEGALLY DISPOSE OF REFUSE, DEBRIS, RUBBISH, AND OTHER MATERIALS RESULTING FROM DEMOLITION OPERATIONS.
5. FIELD-VERIFY THE ROOF DRAIN ELEVATIONS TO ENSURE EFFECTIVE DRAINAGE. PROPER ADJUSTMENTS SHOULD BE MADE TO ACCOMMODATE THE NEW INSULATION AND ROOFING SYSTEM.
6. EXISTING ROOFING MATERIAL MUST UNDERGO AN ASBESTOS SURVEY PRIOR TO DEMOLITION AND DISPOSAL IN ACCORDANCE WITH SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD) RULE 1403. IF ASBESTOS CONTAINING MATERIAL (ACM) IS IDENTIFIED IN ROOFING MATERIAL TO BE DEMOLISHED/REMOVED, ALL WORK INCLUDING DEMOLITION AND DISPOSAL MUST FOLLOW ALL FEDERAL, STATE, LOCAL REGULATIONS, INCLUDING BUT NOT LIMITED TO SCAQMD RULE 1403, CALIFORNIA CODE OF REGULATIONS 1529. ASBESTOS, 40 CFR PART 61 NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP).

ROOF DEMOLITION LEGEND

TO BE DEMOLISHED

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT
RICHARD D. CHONG
No. C 31174
REN. 08/30/27
STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN. R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

DEMOLITION - ROOF PLAN

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

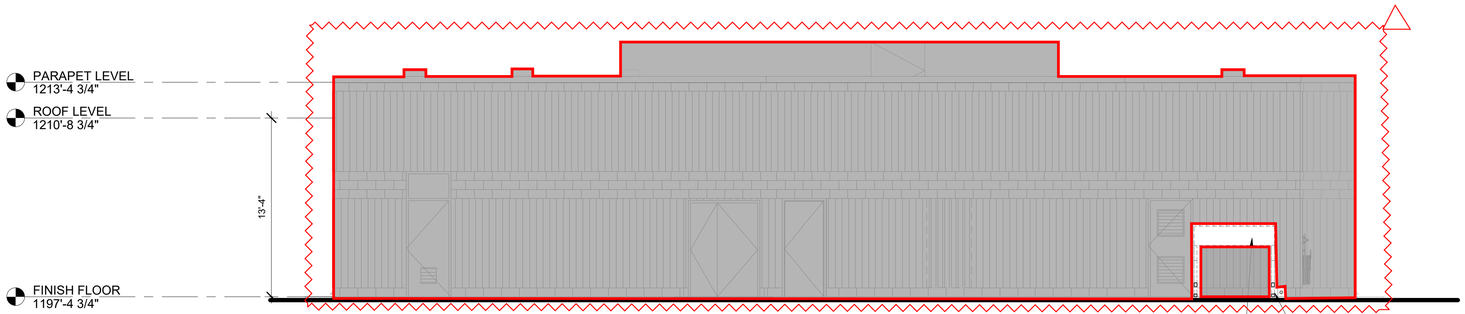
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

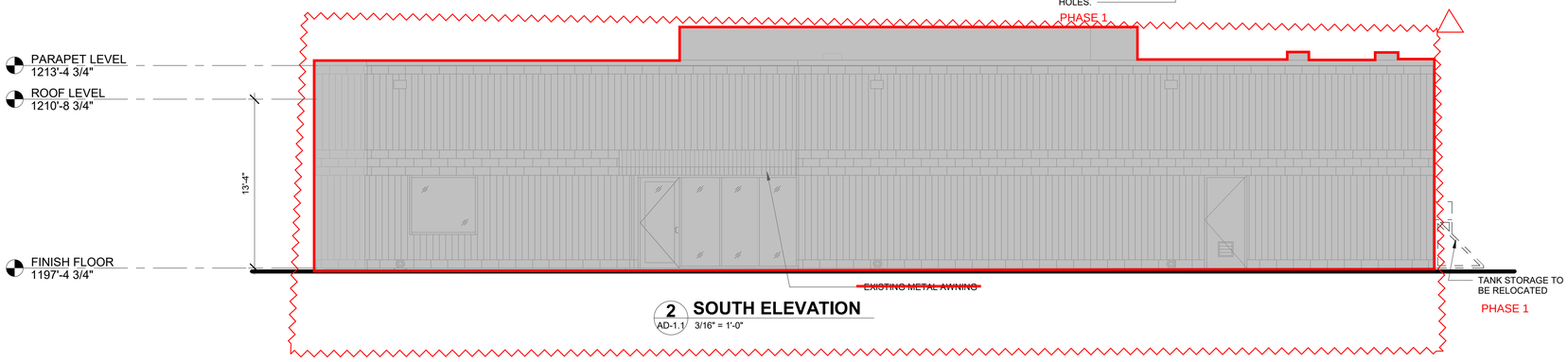
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Vert. AS SHOWN

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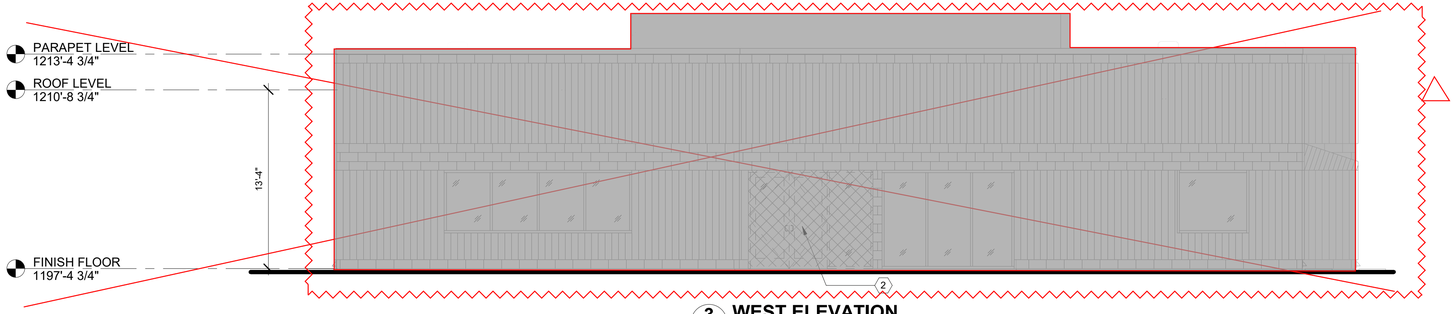
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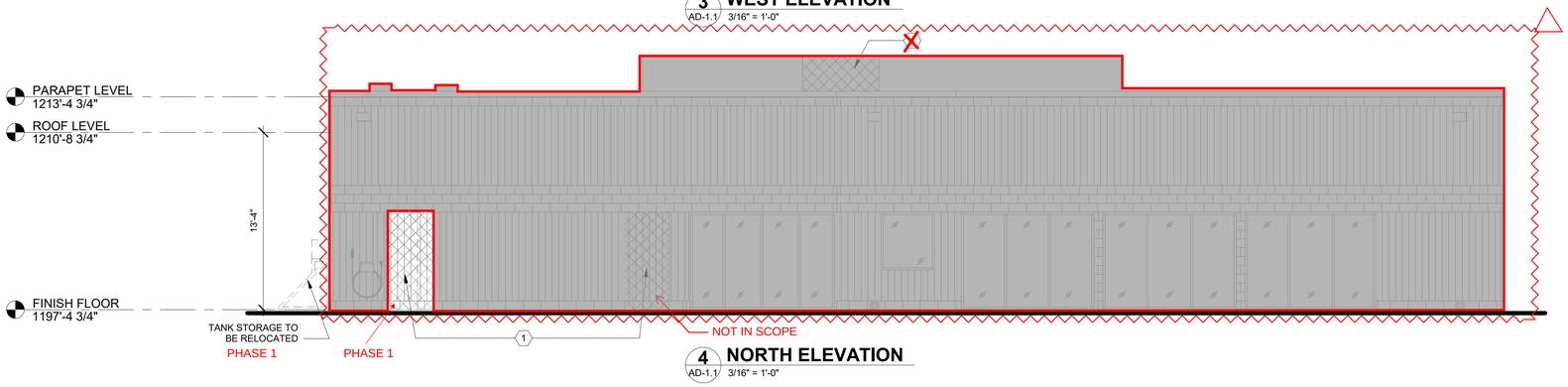
1 EAST ELEVATION
AD-1.1 3/16" = 1'-0"



2 SOUTH ELEVATION
AD-1.1 3/16" = 1'-0"



3 WEST ELEVATION
AD-1.1 3/16" = 1'-0"



4 NORTH ELEVATION
AD-1.1 3/16" = 1'-0"

DEMOLITION KEYNOTES:

1. DEMOLISH EXISTING PORTION OF THE WALL TO RECEIVE NEW DOOR OPENING. PREPARE WALL OPENING READY TO RECEIVE NEW DOOR AND FRAME.
2. ~~REMOVE STOREFRONT WINDOWS AND DOOR. PREPARE WALL OPENING READY TO RECEIVE NEW DOOR AND FRAME. INFILL WALL AS NOTED ON THE ARCHITECTURAL DRAWINGS. REPLACE EXISTING WALL AND FLOOR COMPONENTS DAMAGED DURING DEMOLITION.~~ NOT IN SCOPE
3. RELOCATE EXISTING PIPE TO THE NORTH SIDE OF BUILDING AND SEAL HOLE. SEE FIRE PROTECTION DRAWINGS.
4. ~~REMOVE SCREEN WALL PANEL FOR DUCT CONNECTION. COORDINATE WITH APPROVED MECHANICAL EQUIPMENT. SEE "M" SHEETS.~~ NOT IN SCOPE

GENERAL NOTES:

1. COMPLY WITH APPLICABLE LOCAL, STATE AND FEDERAL CODES AND REGULATIONS PERTAINING TO SAFETY OF PERSONS, PROPERTY AND ENVIRONMENTAL PROTECTION.
2. ERECT AND MAINTAIN DUST PROOF PARTITIONS AS REQUIRED TO PREVENT SPREAD OF DUST, FUMES, AND SMOKE, ETC. TO OTHER PARTS OF THE BUILDING. ON COMPLETION, REMOVE PARTITIONS AND REPAIR DAMAGED SURFACES TO MATCH ADJACENT SURFACES.
3. IF DEMOLITION IS PERFORMED IN EXCESS OF THAT REQUIRED, RESTORE AFFECTED AREAS.
4. REMOVE FROM SITE DAILY AND LEGALLY DISPOSE OF REFUSE, DEBRIS, RUBBISH, AND OTHER MATERIALS RESULTING FROM DEMOLITION OPERATIONS.

ELEVATION DEMOLITION LEGEND

TO BE DEMOLISHED

NOT IN SCOPE

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT
RICHARD D. CHONG
No. C 8119
REN. 08/30/27
STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

DEMOLITION - EXTERIOR ELEVATIONS

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

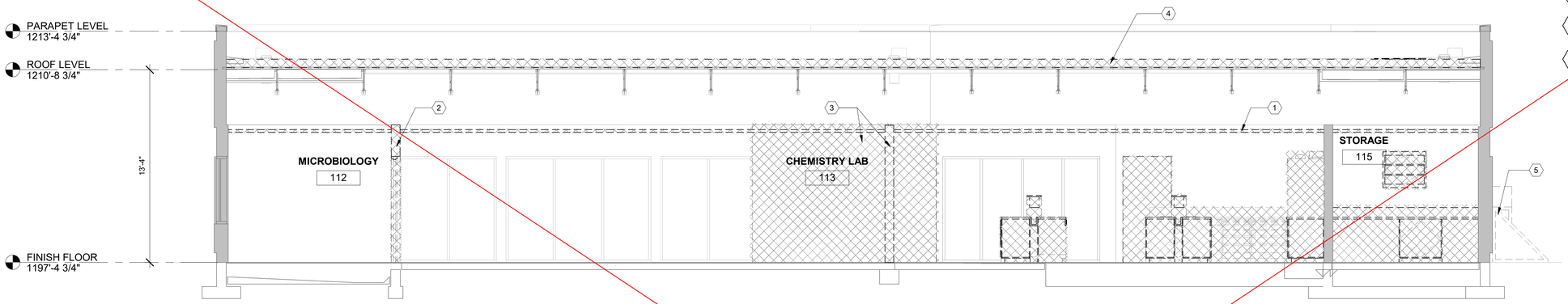
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 15 of 126 Sheets
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Vert. AS SHOWN

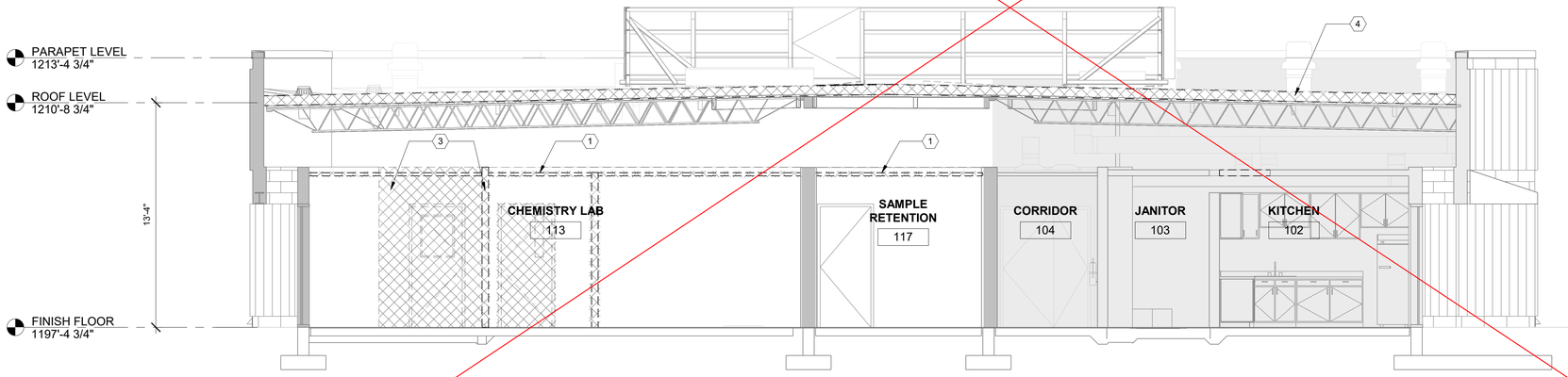
AD-4.1

WW-00007

NOT IN SCOPE- PHASE 2



1 SECTION A
AD-1.1 1/4" = 1'-0"



2 SECTION B
AD-1.1 1/4" = 1'-0"

DEMOLITION KEYNOTES:

1. REMOVE EXISTING ACOUSTICAL LAY-IN CEILING TILE SYSTEM.
2. DEMOLISH EXISTING PORTION OF THE WALL. WHEN DEMOLISHING STEM WALLS, CHIP DOWN 4" BELOW EXISTING CONCRETE SLAB.
3. DEMOLISH PORTION OF EXISTING WALL. REPLACE EXISTING WALL AND FLOOR COMPONENTS DAMAGED DURING DEMOLITION.
4. DEMOLISH AND REPLACE EXISTING ROOFING SYSTEM AND INSULATION.
5. TANK STORAGE TO BE RELOCATED.

GENERAL NOTES:

1. COMPLY WITH APPLICABLE LOCAL, STATE AND FEDERAL CODES AND REGULATIONS PERTAINING TO SAFETY OF PERSONS, PROPERTY AND ENVIRONMENTAL PROTECTION.
2. ERECT AND MAINTAIN DUST PROOF PARTITIONS AS REQUIRED TO PREVENT SPREAD OF DUST, FUMES, AND SMOKE, ETC. TO OTHER PARTS OF THE BUILDING. ON COMPLETION, REMOVE PARTITIONS AND REPAIR DAMAGED SURFACES TO MATCH ADJACENT SURFACES.
3. IF DEMOLITION IS PERFORMED IN EXCESS OF THAT REQUIRED, RESTORE AFFECTED AREAS.
4. REMOVE FROM SITE DAILY AND LEGALLY DISPOSE OF REFUSE, DEBRIS, RUBBISH, AND OTHER MATERIALS RESULTING FROM DEMOLITION OPERATIONS.

DEMOLITION LEGEND

- TO BE DEMOLISHED
- EXISTING, TO REMAIN
- NO ARCHITECTURAL SCOPE

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER
RICHARD D. CHONG
NO. C 81711
REN. 08/30/27
STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

DEMOLITION - BUILDING SECTIONS

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

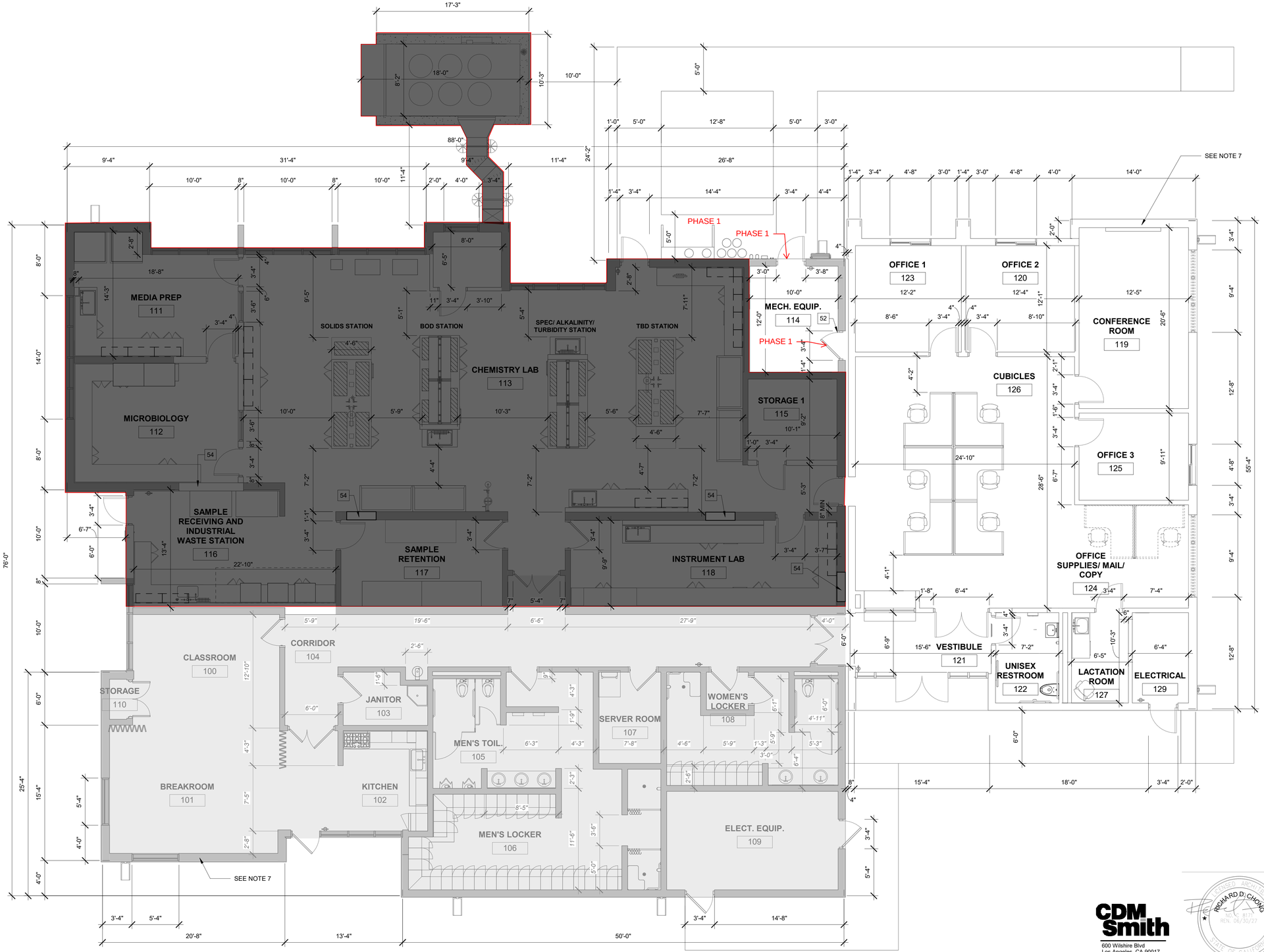
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 16 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

AD-5.1

WW-00007



N

DIMENSIONS FLOOR PLAN

3/16" = 1'-0"

KEYNOTE LEGEND	
KEY VALUE	KEYNOTE TEXT
52	SEAL MECHANICAL ROOM DOOR, INCLUDING LOUVER.
~~54~~	~~CMP WALL INFILL MATCH THE EXISTING ADJACENT WALL THICKNESS AND FINISH.~~

GENERAL NOTES:

1. INFILL WALLS TO MATCH THICKNESS OF THE EXISTING ADJACENT WALLS.
2. SYSTEM FURNITURE SHOWN IN THE NEW ADDITION ARE (NOT IN CONTRACT) NIC.
3. FURNITURE LAYOUT IS SHOWN FOR PLANNING PURPOSES ONLY.
4. ~~FOR ENLARGED PLANS OF EACH INDIVIDUAL LAB ISLAND, SEE SHEETS A-1.5 TO A-1.9.~~
5. ~~LABORATORY EQUIPMENT WILL BE PROVIDED AND INSTALLED BY REDLANDS CITY, UNLESS OTHERWISE NOTED ON DRAWINGS.~~
6. PROVIDE BLOCKING FOR WALL-HUNG ITEMS IN LAB AND OFFICE ADDITION. ITEMS INCLUDE BUT NOT LIMITED TO WALL-HUNG CASEWORK, EQUIPMENT BY OTHER TRADES, OFFICE FURNITURE, ETC.
7. ELECTRICAL OUTLET PROVIDED FOR ASSISTIVE LISTENING DEVICE SYSTEM (PROVIDED BY CITY).

FLOOR PLAN LEGEND

- EXISTING, TO REMAIN
- NO ARCHITECTURAL SCOPE
- NEW
- FUTURE SCOPE
- NOT IN SCOPE

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Tel: (213) 457-2200

REGISTERED ARCHITECT RICHARD D. CHONG NO. C 8171 REN. 08/30/27 STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
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Revisions

CITY OF REDLANDS

Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

FLOOR PLAN - DIMENSIONS

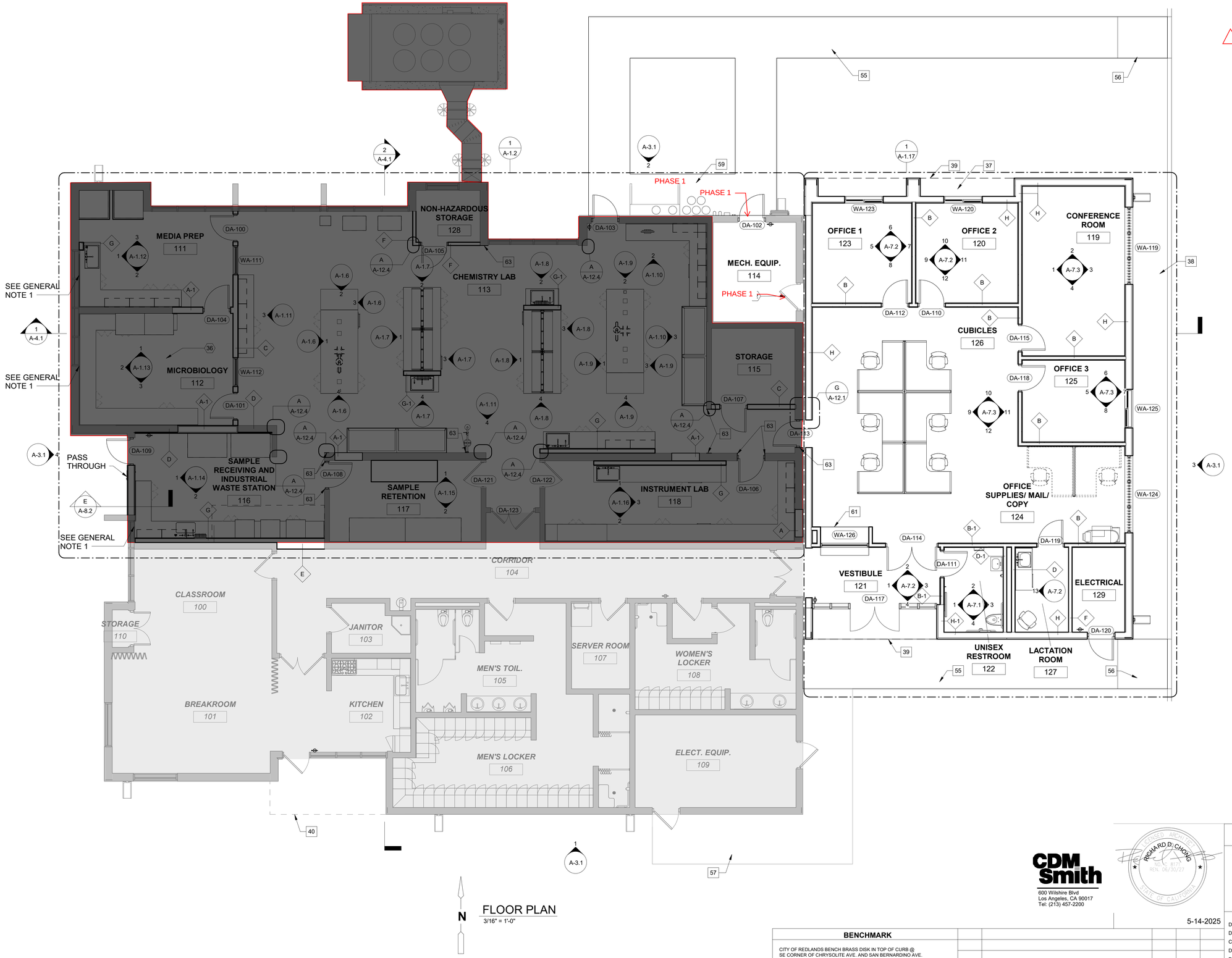
Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 — 6/11/2025 DATE
APPROVED BY: Goutam K. Dobey, City Engineer, RCE 75646 — 6/11/2025 DATE

Sheet 17 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-1.0

WW-00007



KEYNOTE LEGEND	
KEY VALUE	KEYNOTE TEXT
~~36~~	~~INFILL EXISTING RECESSED FLOOR FLUSH WITH LAB FLOOR~~
37	SHRUBBERY BY OWNER
38	GRASS
39	BUILDING SOFFIT ABOVE
40	EXISTING CANOPY
52	SEAL MECHANICAL ROOM DOOR, INCLUDING LOUVER
55	NEW SIDEWALK, SEE "C" SHEETS
56	RAMP, SEE "C" SHEETS
57	EXISTING SIDEWALK, SEE "C" SHEETS
59	CONCRETE PAD, SEE "S" SHEETS
61	ADA COUNTER
~~63~~	~~PATCH AND REPAIR, TO MATCH THE EXISTING ADJACENT WALL~~

GENERAL NOTES:

1. PAINT BACK OF CABINET BLACK.
2. SEE CIVIL DRAWINGS FOR SIDEWALKS AND CURBS.
3. INFILL WALLS TO MATCH THICKNESS OF THE EXISTING ADJACENT WALLS.
4. REFER TO SHEET A-10.1 FOR PARTITION TYPES.

FLOOR PLAN LEGEND

- EXISTING, TO REMAIN
- NO ARCHITECTURAL SCOPE
- NEW
- FUTURE SCOPE
- NOT IN SCOPE

FLOOR PLAN

3/16" = 1'-0"

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

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REGISTERED PROFESSIONAL ENGINEER RICHARD D. CHONG NO. C 81711 REN. 08/30/27 STATE OF CALIFORNIA

5-14-2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

FLOOR PLAN

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

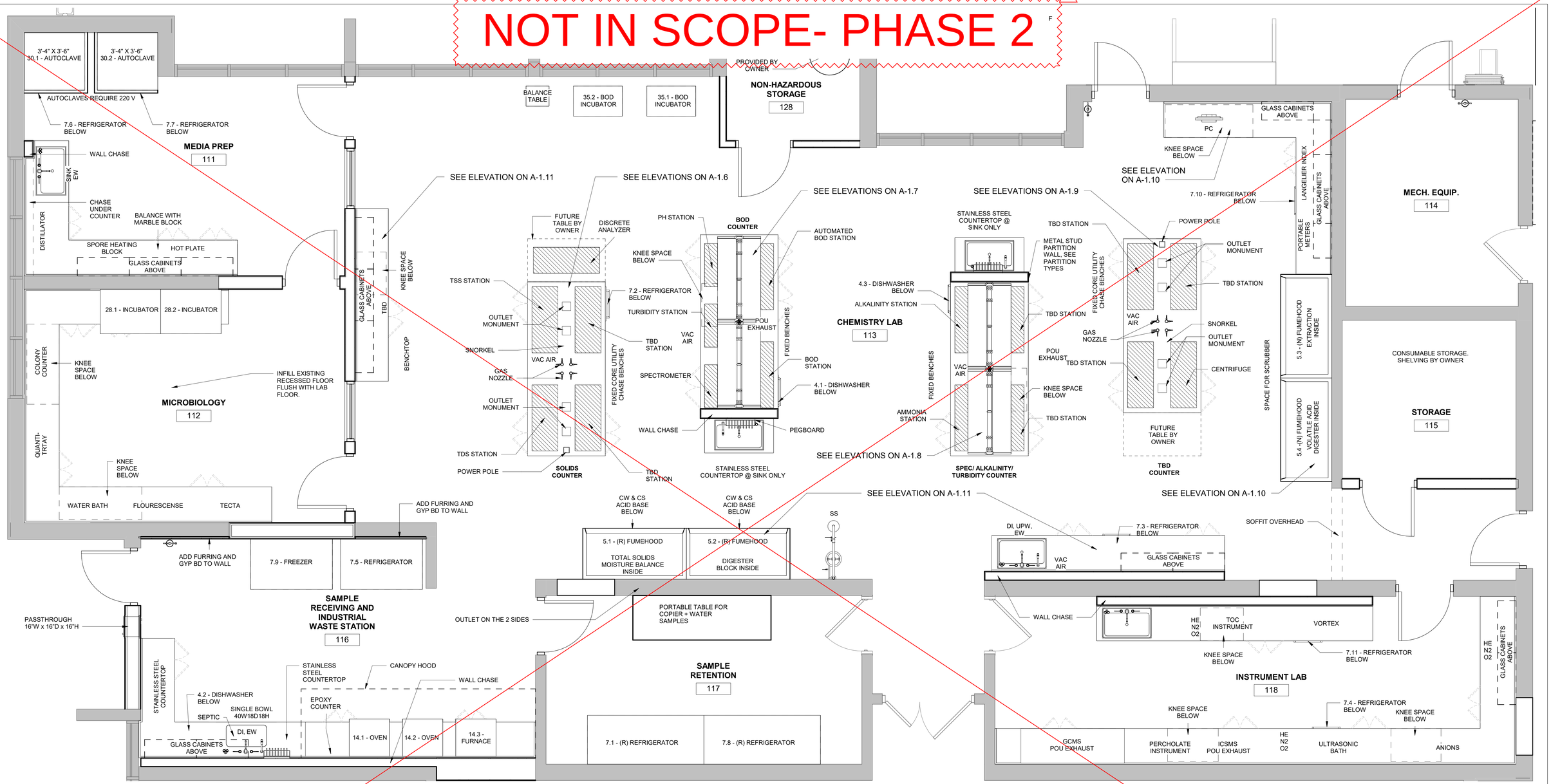
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 18 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-1.1

WW-00007

NOT IN SCOPE- PHASE 2



LAB EQUIPMENT TAGS:

1 - ALKALINITY	7.6 - REFRIGERATOR	16 - VOLATILE ACIDS	30.2 - AUTOCLAVE
2 - AMMONIA	7.7 - REFRIGERATOR	17 - ANIONS	31 - TECTA
3 - BOD	7.8 - REFRIGERATOR	18 - PERCHOLATE INSTRUMENT	32 - CANOPY HOOD
4.1 - DISHWASHER	7.9 - FREEZER	19 - TOC INSTRUMENT	33 - PC
4.2 - DISHWASHER	7.10 - REFRIGERATOR	20 - ULTRA SONIC BATH	34 - AUTOMATED BOD
4.3 - DISHWASHER	7.11 - REFRIGERATOR	21 - VORTEX	35.1 - BOD INCUBATOR
5.1 - FUMEHOOD	8 - SPECTROMETER	22 - DISTILLATOR	35.2 - BOD INCUBATOR
5.2 - FUMEHOOD	9 - TURBIDITY	23 - FLOURESCENCE	
5.3 - FUMEHOOD	10 - DISCRETE ANALYZER	24 - SPORE HEATING BLOCK	
5.4 - FUMEHOOD	11 - LANGELIER INDEX (LI)	25 - COLONY COUNTER	
6 - pH STATION	12 - SEPTIC INSTRUMENTS	26 - HOT PLATE	
7.1 - REFRIGERATOR	13 - TYPE II WATER	27 - WATER BATH	
7.2 - REFRIGERATOR	14.1 - OVEN	28.1 - INCUBATOR	
7.3 - REFRIGERATOR	14.2 - OVEN	28.2 - INCUBATOR	
7.4 - REFRIGERATOR	14.3 - FURNACE	29 - QUANTI-TRAY	
7.5 - REFRIGERATOR	15 - MOISTURE BALANCES	30.1 - AUTOCLAVE	

GENERAL NOTES:

1. (R) INDICATES RELOCATION OF EQUIPMENT.
2. (N) INDICATES NEW EQUIPMENT.
3. LABORATORY EQUIPMENT WILL BE PROVIDED AND INSTALLED BY REDLANDS CITY, UNLESS OTHERWISE NOTED ON DRAWINGS.
4. SHADED BOX DENOTES LAB STATION WITH SEVERAL PIECES OF EQUIPMENT. SEE EQUIPMENT LIST ON A-1.3 TO A-1.5.
5. NUMBERS ON FLOOR PLAN DENOTE EQUIPMENT TAGS FROM A-1.3 TO A-1.5.
6. "HE", "N2", "O2", AND "VAC AIR" DENOTES GAS CONNECTIONS AT COUNTER.
7. DATA JACK AT EVERY KNEE SPACE, SEE ENLARGED PLANS FOR KNEE SPACE LOCATIONS.
8. FOR ENLARGED FLOOR PLANS AND ELEVATIONS OF EACH INDIVIDUAL LAB COUNTER, SEE SHEETS A-1.6 TO A-1.16.

N

CHEMISTRY LAB ENLARGED FLOOR PLAN

3/8" = 1'-0"

LAB FLOOR PLAN LEGEND

EXISTING, TO REMAIN

NEW

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LICENSED ARCHITECT — RICHARD D. CHONG — REN: 08/30/27 — STATE OF CALIFORNIA

5-14-2025

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Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

CHEMISTRY LAB ENLARGED FLOOR PLAN

Design by:	TIM KING	
Date:	MAY 2025	
Checked by:	RICHARD CHONG	
Date:	MAY 2025	
Drawn by:	DANIEL ARTEAGA	
Date:	MAY 2025	
Checked by:	VALERIA NORATO	
Date:	MAY 2025	

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 19 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-1.2

WW-00007

NOT IN SCOPE- PHASE 2

PLAN TAG	EXISTING LAB EQUIPMENT LIST	EXISTING / FUTURE	MAJOR EQUIPMENT NAME	LAB ROOM #	LAB ROOM NAME	SERIAL #				
1	***Alkalinity Station***									
	Alkalinity	Existing	Autotitrator	103	Chemistry Lab	C225308184				
	Alkalinity	Existing	Autosampler	103	Chemistry Lab	C336379335	Mettler Toledo InLine Flex			
	Alkalinity	Existing	Support	103	Chemistry Lab	B510669456	Mettler Toledo Dosing Unit			
	Alkalinity	Existing	pH Probe	103	Chemistry Lab	2204961	Mettler Toledo Glass Electrode DG-			
	Alkalinity	Existing	Conductivity	103	Chemistry Lab	5823371251	Mettler Toledo InLab 731			
	Alkalinity	Existing	Support	103	Chemistry Lab	30094167	Mettler Toledo Power Shower Rinse Flex			
2	***Ammonia Station***									
	Ammonia	Existing	Meter	103	Chemistry Lab	94103169	Fisher Scientific Accumet XL 250			
	Ammonia	Existing	Probe	103	Chemistry Lab	19130	Hach Ammonia ISE			
	Ammonia	Existing	Heating/Stir plate	103	Chemistry Lab	1619060540423	Fisher Scientific ISO Temp			
	Ammonia	Existing	Heating Device	103	Chemistry Lab	300464898	Thermo Scientific Waterbath			
3	***BOD Station***									
	BOD	Existing	Probe	103	Chemistry Lab	231323039490	Hach LBOD 101			
	BOD	Existing	Meter	103	Chemistry Lab	211602200010	Hach HQ2200			
	BOD	Existing	Stir plate	103	Chemistry Lab	C2410029061504783	Thermo Scientific Cimarec+ S88854100			
	BOD	Existing	Stir plate	103	Chemistry Lab	176080503327	Fisher Scientific 11-510-49S			
	BOD	Existing	Stir plate	103	Chemistry Lab	1762071008033	Fisher Scientific 11-510-49S			
	BOD	Existing	Reactor	103	Chemistry Lab	22060C0248	Hach 30x16mm wells(Double Chamber)			
4	***Dishwashers***									
4.1	*Dishwasher*	Existing	Dishwasher	103	Chemistry Lab	18441644	Miele PG8583 (Wet Chem)			
4.2	*Dishwasher*	Existing	Dishwasher	106	Sample Rec.	1391501	Miele G7883 (Sampling Room)			
4.3	*Dishwasher*	Future	Dishwasher	103	Chemistry Lab					
5	***Fumehoods***									
5.1	*Fumehood*	Existing	Fumehood	103	Chemistry Lab	N/A	Kewaunee N/A			
5.2	*Fumehood*	Existing	Fumehood	103	Chemistry Lab	N/A	Labconco N/A			
5.3	*Fumehood*	Future	Fumehood	103	Chemistry Lab	N/A	Custom N/A			
5.4	*Fumehood*	Future	Fumehood	103	Chemistry Lab	N/A	Custom N/A			
6	***pH Station***									
	pH	Existing	Meter	103	Chemistry Lab	XL94107848	Fisher Scientific Accumet XL250			
	pH	Existing	Probe	103	Chemistry Lab	20062014P	Fisher Scientific Accu-pHast Electrode			
	pH	Existing	Stir plate	103	Chemistry Lab	C2710028071639710	Thermo Scientific Cimarec+ S88857100			
7	***Refrigerators/ Freezer***									
7.1	*Refrigerator*	Existing	Storage	107	Sample Reten.	8647622-1602	American Biotech Supply Sample Refrigerator:			
7.2	*Refrigerator*	Existing	Storage	103	Chemistry Lab	2022 03 000023	Summit Appliance Main Lab #1			
7.3	*Refrigerator*	Existing	Storage	103	Chemistry Lab	1B0122Z0007JB9HHHE10296	Hisense Main Lab #2:			
7.4	*Refrigerator*	Existing	Storage	109	Instrument Lab	32KHS05741	Hisense IC Room:			
7.5	*Refrigerator*	Existing	Storage	106	Sample Rec.	JM1111HYT091300092J1	American Biotech Supply Explosive Refrigerator			
7.6	*Refrigerator*	Existing	Storage	101	Media Prep	2206001475	Magic Chef HMAR265BE: Bacti	115 V	Receptacle	0.8 amps
7.7	*Refrigerator*	Existing	Storage	101	Media Prep	2206008732	Magic Chef HMAR265BE: Bacti	115 V	Receptacle	0.8 amps
7.8	*Refrigerator*	Existing	Storage	107	Sample Reten.	8647622-1602	American Biotech Supply Sample Refrigerator:			
7.9	*Freezer*	Existing	Storage	106	Sample Rec.	LT231535	Vissani DCM5QRBWW	115 VAC	Receptacle	1.7 amps
7.10	*Refrigerator*	Future	Storage	103	Chemistry Lab	32KHS05741	Hisense			
7.11	*Refrigerator*	Future	Storage	109	Instrument Lab	32KHS05741	Hisense			
7.12	*Refrigerator*	Future	Storage	127	Lactation Room	32KHS05741	Hisense			
8	***Spectrometer***									
	Spectrometer	Existing	Meter	103	Chemistry Lab	2060277	Hach DR6000			
9	***Turbidity Station***									
	Turbidity	Existing	Meter	103	Chemistry Lab	2032071	Hach TU5200			
10	***Discrete Analyzer***									
	Analyzer	Existing	Analytical	103	Chemistry Lab	861000513366	Thermo Fisher Scientific Thermo Gallery Discrete Analyzer			
11	***Langelier Index***									
	Calcium	Existing	Photometer	103	Chemistry Lab	906300153111	Hanna Instruments Calcium & Magnesium Photometer			
	Handheld	Existing	IPAD	103	Chemistry Lab	NHQYWXHT9L	Apple IPAD Pro (11in.) 3rd Gen.			
	Handheld	Existing	Analyzer	103	Chemistry Lab	005U	e-sens e-Roam			

EQUIPMENT LIST LEGEND

INCLUDES MULTIPLE PIECES OF EQUIPMENT NOT LISTED, BUT INSTALL AND LOCATED BY CITY OF REDLANDS.

GENERAL NOTES:

1. EQUIPMENT LISTED UNDER ONE NUMBER IS LOCATED IN CLOSE PROXIMITY TO EACH OTHER.
2. EQUIPMENT LISTED UNDER THE SAME NAME, BUT UNDER DIFFERENT NUMBERS INDICATES THAT THE EQUIPMENT IS LOCATED IN DIFFERENT LOCATIONS.
3. LABORATORY EQUIPMENT WILL BE PROVIDED AND INSTALLED BY REDLANDS CITY, UNLESS OTHERWISE NOTED ON DRAWINGS.

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LICENSED ARCHITECT
RICHARD D. CHONG
NO. C 31777
REN. 08/31/27
STATE OF CALIFORNIA

5-14-2025

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Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

EQUIPMENT LIST 1

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 20 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-1.3

WW-00007

NOT IN SCOPE- PHASE 2

PLAN TAG	EXISTING LAB EQUIPMENT LIST	EXISTING / FUTURE	MAJOR EQUIPMENT NAME	LAB ROOM #	LAB ROOM NAME	SERIAL #					
12	***Septic***										
	Analyzer	Existing	Multi-Meter	106	Sample Rec.	TA06210397					
	Analyzer	Existing	Probe	106	Sample Rec.	1031045N	Hanna Instruments HI12883				
13	***Type II Water***										
	Dispenser	Existing	Pure Flex 2	103	Chemistry Lab	FLB00015648	Veolia/ELGA PF2XXXXM1-US				
14	***Ovens & Furnace***										
14.1	*Solids*	Existing	Support	106	Sample Rec.	43080124	Fisher Brand Isotemp General Purpose Oven	100-120V	Dedicated Receptacle	13.8 amps/1.66 KW	
14.2	*Solids*	Existing	Support	106	Sample Rec.	43079942	Fisher Brand Isotemp General Purpose Oven	100-120V	Dedicated Receptacle	13.8 amps/1.66 KW	
14.3	*Solids*	Existing	Support	106	Sample Rec.	J3270055	Yamato Muffle Furnace	220V	Dedicated Receptacle	18.5 Amps	
15	***Moisture Balances***										
	Total Solids	Existing	Moisture Balance	103	Chemistry Lab	P1019666	A&D Company AND MX-50	100-120V	Receptacle	3 amps	
	Total Solids	Existing	Moisture Balance	103	Chemistry Lab	P1063325	A&D Company AND MF-50	100-120V	Receptacle	3 amps	
	Total Solids	Existing	Moisture Balance	103	Chemistry Lab	C325357913	Ohaus MB27	100-120V	Receptacle	3 amps	
16	***Volatile Acids***										
	Volatile Acids	Existing	Support	103	Chemistry Lab	C1710015051501443	Fisher Brand Hot Plate	100-120V	Dedicated Receptacle	13 amps	
	Volatile Acids	Existing	Support	103	Chemistry Lab	C1756150102420	Thermo Scientific Hot Plate	100-120V	Dedicated Receptacle	8.80 amps	
	Volatile Acids	Existing	Support	103	Chemistry Lab	C1756130736176	Thermo Scientific Hot Plate	100-120V	Dedicated Receptacle	8.80 amps	
	Volatile Acids	Existing	Support	103	Chemistry Lab	43121822	Thermo Scientific Centifuge: Sorvall ST Plus Series	100-240V	Receptacle	8.5 amps/ 850 W	
17	***Anions***										
	Anions	Existing	Analyzer	109	Instrument Lab	22053159	Thermo Scientific Dionex Integrion HPIC System	100-240V	Receptacle	5.0 amps	
	Anions	Existing	Support	109	Instrument Lab	22063537	Thermo Scientific AS=AP AutoSampler	100-240V	Receptacle	4.0 amps	
18	***Perchlorate Instrument***										
	Perchlorate	Existing	Analyzer	109	Instrument Lab	19090979	Thermo Scientific Dionex Integrion HPIC System	100-240V	Receptacle	5.0 amps	
	Perchlorate	Existing	Support	109	Instrument Lab	11030369	Thermo Scientific AS-DV Autosampler	100-240V	Receptacle	1.0 amps	
	Perchlorate	Existing	Support	109	Instrument Lab	V0015495	Thermo Scientific AXP Pump	100-240V	Receptacle	1.0 amps/45 W	
19	***TOC Instrument***										
	TOC	Existing	Analyzer	109	Instrument Lab	22B107725	Xylem O-I-Analytical Aurora Model 1030	115V	Receptacle	6.3 amps	
	TOC	Existing	Support	109	Instrument Lab	E921788286	Xylem Autosampler Model 1088	100-240V	Receptacle	4 amps	
20	***Ultra Sonic Bath***										
	Instrumentation	Existing	Support	109	Instrument Lab	BGP112164480B	Emeerson-Branson Ultra Sonic Bath: CPX5800	120V	Receptacle	1.5 amps/40 W	
21	***Vortex***										
	Instrumentation	Existing	Support	109	Instrument Lab	152954	Cole-Palmer Vortex	120V	Receptacle	50 W	
22	***Distillator***										
	Distillator	Existing	Production	101	Media Prep	BN2306DOO9-PSON (1)	Pure & Secure LLC Mini Classic CT	120 V	Receptacle	13 amps	
	Distillator	Existing	Production	101	Media Prep	BN2306DOO9-PSON (1)	Pure & Secure LLC Mini Classic CT	120 V	Receptacle	13 amps	
23	***Flourescence/ UV Lamp***										
	Flourescence	Existing	Support Item	102	Microbiology	2210648	Idexx Long Wave UV 365 nm Lamp	120 V	Receptacle	120 W	
	Flourescence	Existing	Support Item	102	Microbiology	2210648	Idexx Analysis Cabinet	N/A	N/A	N/A	
24	***Spore Heating Block***										
	Spore	Existing	Heating Device	101	Media Prep	BA22CAQ0000869	Scilogex SCI120-S Spore Block	100-120 V	Receptacle	170 W	
25	***Colony Counter***										
	HPC	Existing	Darkfield Colony Counter	102	Microbiology	01748-0507	Reichert Quebec 3325 Darkfield Colony Counter	120 V	Receptacle	40W	
26	***Hot Plate***										
	Media	Existing	Heating Device	N/A	Various Locations	M3710028052101619	Thermo Scientific SP88857100 Hot Plate+Stirrer	100-120 V	Receptacle	13 amps	
27	***Water Bath***										
	Water Bath	Existing	Heating Device	102	Microbiology	300395267	Thermo Scientific Precision CIR 35	100-115 V	Receptacle	12 amps	
28	***Incubators***										
28.1	*Incubator*	27	Heating Device	102	Microbiology	12015809	VWR Model 1555 Incubator	120 V	Receptacle	8.5 amps	
28.2	*Incubator*	Existing	Heating Device	102	Microbiology	12015909	VWR Model 1555 Incubator	120 V	Receptacle	8.5 amps	

EQUIPMENT LIST LEGEND

INCLUDES MULTIPLE PIECES OF EQUIPMENT NOT LISTED, BUT INSTALL AND LOCATED BY CITY OF REDLANDS.

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3. LABORATORY EQUIPMENT WILL BE PROVIDED AND INSTALLED BY REDLANDS CITY, UNLESS OTHERWISE NOTED ON DRAWINGS.

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LICENSED ARCHITECT
RICHARD D. CHONG
NO. C 8171
REN. 08/30/27
STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

EQUIPMENT LIST 2

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 21 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-1.4

WW-00007

NOT IN SCOPE- PHASE 2

PLAN TAG	EXISTING LAB EQUIPMENT LIST	EXISTING / FUTURE	MAJOR EQUIPMENT NAME	LAB ROOM #	LAB ROOM NAME	SERIAL #					
29	***Quanti-Tray***										
	Quanti-Tray	Existing	Sealer Device	102	Microbiology	QTP132014					
30	***Autoclaves***										
30.1	*Sterilization*	Existing	Support	101	Media	22081104	Tuttnauer Autoclave	230 V	Dedicated Receptacle	13 amps	
30.2	*Sterilization*	Existing	Support	101	Media	22121109	Tuttnauer Autoclave	230 V	Dedicated Receptacle	13 amps	
31	***Tecta***										
	Tecta	Existing	Analyzer	102	Microbiology	TB16A30001016	Tecta-PDS/Idexx Tecta B16: Automated Microbiology Testing System	100-120 V	Receptacle	13 amps	49 cm (W) x 64 cm (D) x 36 cm (H)
	Tecta	Existing	Support	102	Microbiology	4B2329P01714	APC BX1350M: Back Up Battery	100-120 V	Receptacle	13 amps	
32	***Canopy Hood***										
	Canopy Hood	Existing	Suport	106	Sample Rec.		Custom	100-120 V	Receptacle	10.2 amps	
33	***PC***										
	Instrumentation	Future	PC System	103	Chemistry Lab		GCMS 5977C	120 VAC	Receptacle	1000 VA	
34	***Automated BOD***										
	BOD	Existing	Automated BOD	103	Chemistry Lab		Mantech AM402				92 cm (W) x 74 cm (D) x 82 cm (H)
35	***BOD Incubators***										
35.1	*BOD*	Existing	Incubator	103	Chemistry Lab	2018071081089	Fisher 11-679-25C				
35.2	*BOD*	Existing	Incubator	103	Chemistry Lab	43143255	Thermo Fisher Isotemp Peltier 381L Incubator				

EQUIPMENT LIST LEGEND

INCLUDES MULTIPLE PIECES OF EQUIPMENT NOT LISTED, BUT INSTALL AND LOCATED BY CITY OF REDLANDS.

GENERAL NOTES:

1. EQUIPMENT LISTED UNDER ONE NUMBER IS LOCATED IN CLOSE PROXIMITY TO EACH OTHER.
2. EQUIPMENT LISTED UNDER THE SAME NAME, BUT UNDER DIFFERENT NUMBERS INDICATES THAT THE EQUIPMENT IS LOCATED IN DIFFERENT LOCATIONS.
3. LABORATORY EQUIPMENT WILL BE PROVIDED AND INSTALLED BY REDLANDS CITY, UNLESS OTHERWISE NOTED ON DRAWINGS.

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT
RICHARD D. CHONG
No. 8177
REN. 08/30/27
STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

EQUIPMENT LIST 3

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

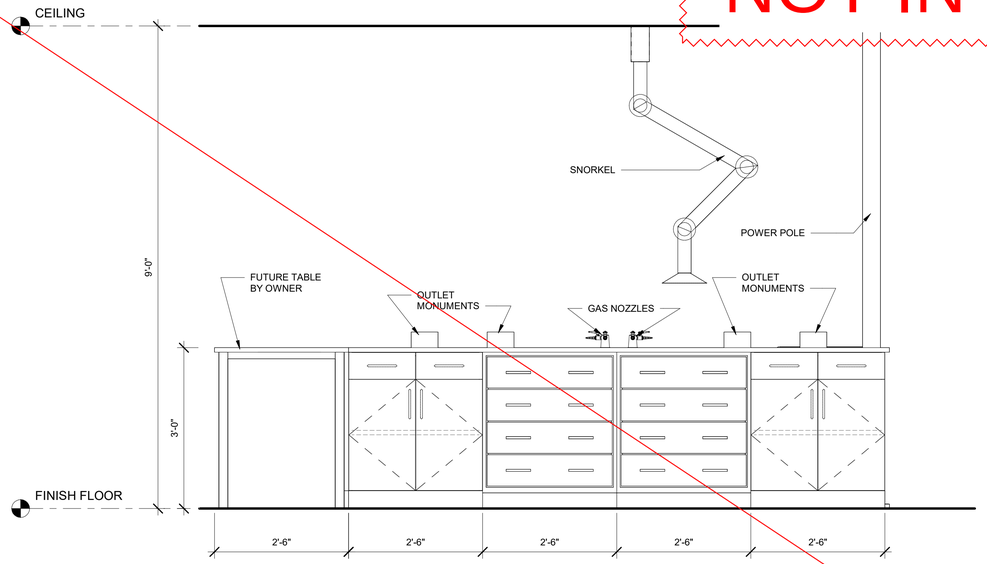
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 22 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

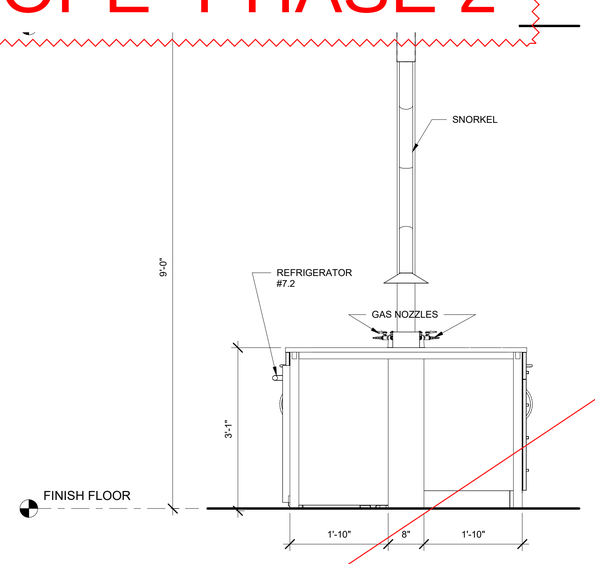
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WW-00007

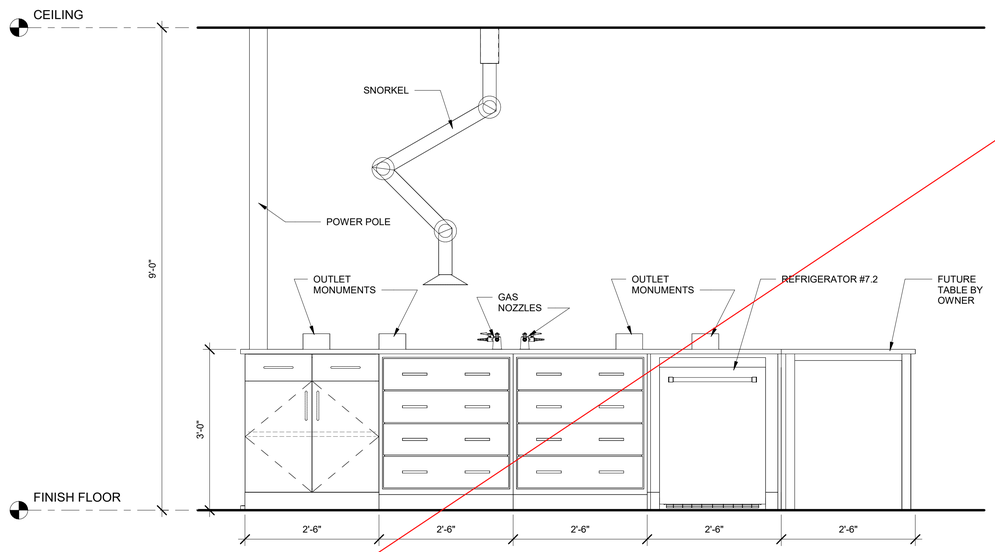
NOT IN SCOPE- PHASE 2



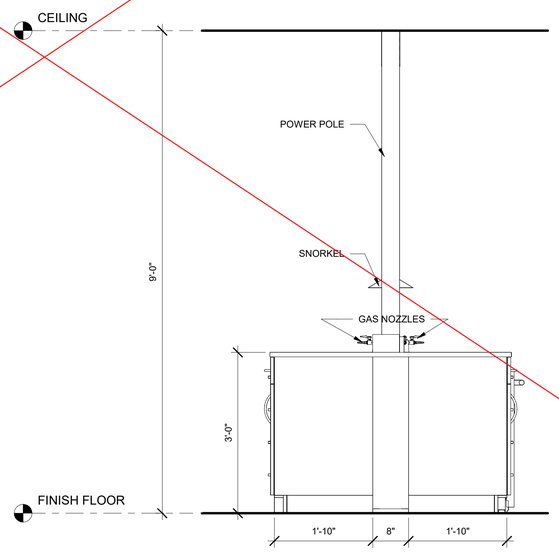
1 A-1.1 **CHEMISTRY LAB SOLIDS COUNTER ELEVATION - WEST**
3/4" = 1'-0"



2 A-1.1 **CHEMISTRY LAB SOLIDS COUNTER ELEVATION - NORTH**
3/4" = 1'-0"



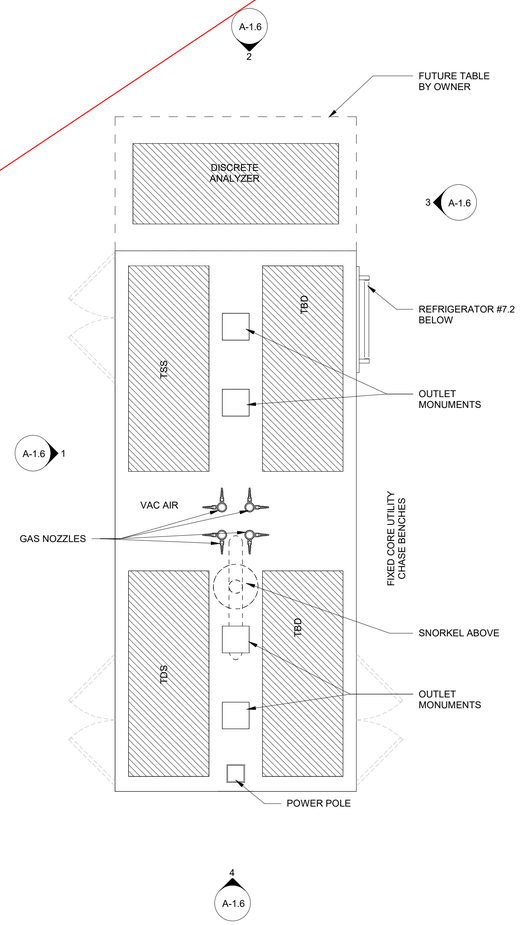
3 A-1.1 **CHEMISTRY LAB SOLIDS COUNTER ELEVATION - EAST**
3/4" = 1'-0"



4 A-1.1 **CHEMISTRY LAB SOLIDS COUNTER ELEVATION - SOUTH**
3/4" = 1'-0"

GENERAL NOTES:

1. REFER TO SHEETS A-1.3 TO A-1.5 FOR EQUIPMENT LIST.



SOLIDS COUNTER ENLARGED FLOOR PLAN
3/4" = 1'-0"

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT RICHARD D. CHONG C-31 REN. 06/30/27 STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

CHEMISTRY LAB SOLIDS COUNTER ENLARGED FLOOR PLAN AND ELEVATIONS

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY:
6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

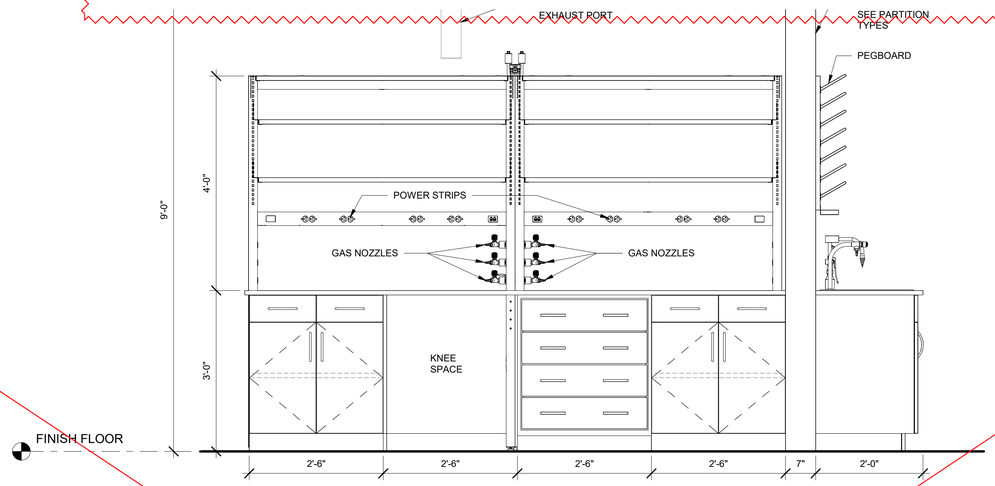
APPROVED BY:
6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 23 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

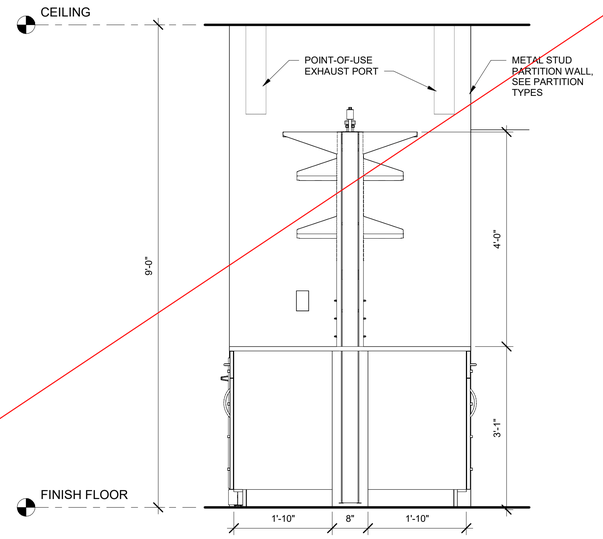
A-1.6

WW-00007

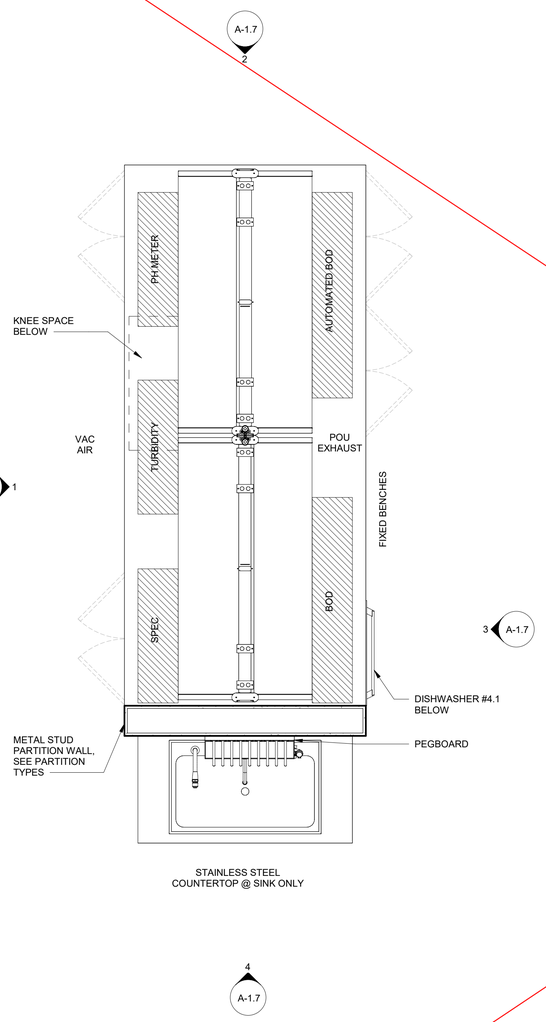
NOT IN SCOPE- PHASE 2



1 A-1.1 **CHEMISTRY LAB BOD COUNTER ELEVATION - WEST**
3/4" = 1'-0"



2 A-1.1 **CHEMISTRY LAB BOD COUNTER ELEVATION - NORTH**
3/4" = 1'-0"



BOD COUNTER ENLARGED FLOOR PLAN
3/4" = 1'-0"

3 A-1.1 **CHEMISTRY LAB BOD COUNTER ELEVATION - EAST**
3/4" = 1'-0"

4 A-1.1 **CHEMISTRY LAB BOD COUNTER ELEVATION - SOUTH**
3/4" = 1'-0"

GENERAL NOTES:

1. REFER TO SHEETS A-1.3 TO A-1.5 FOR EQUIPMENT LIST.

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT RICHARD D. CHONG REN. 08/30/27 STATE OF CALIFORNIA

5-14-2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

CHEMISTRY LAB BOD COUNTER ENLARGED FLOOR PLAN AND ELEVATIONS

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

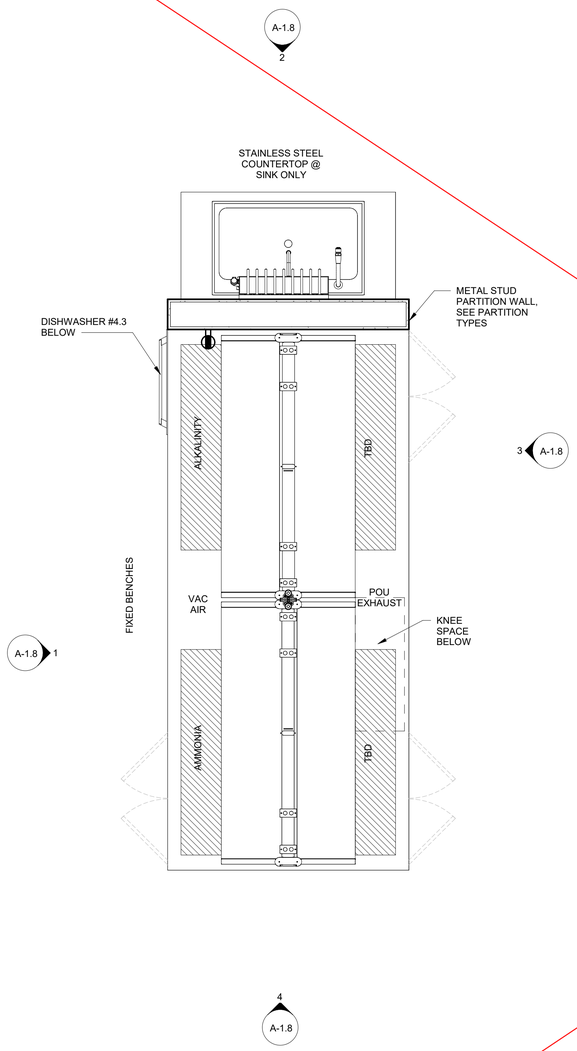
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 24 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-1.7

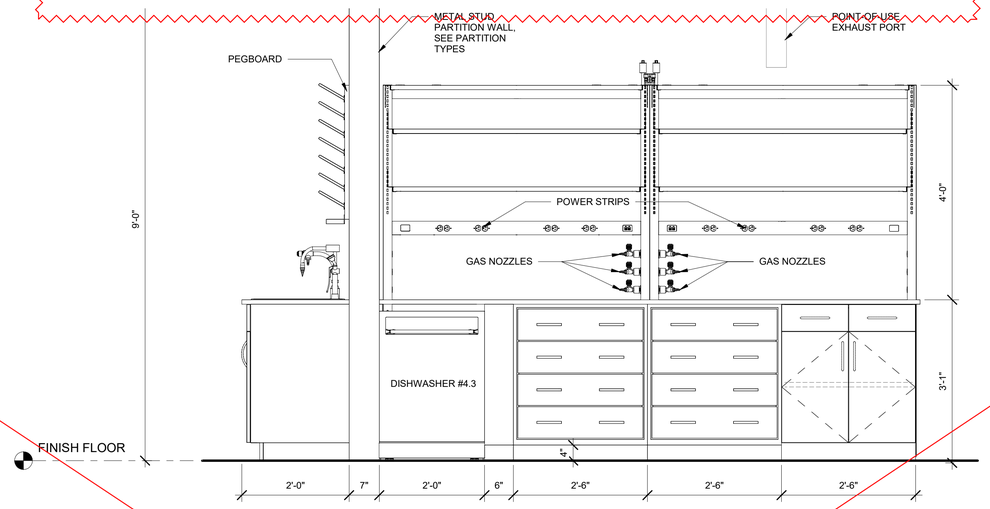
WW-00007

NOT IN SCOPE- PHASE 2



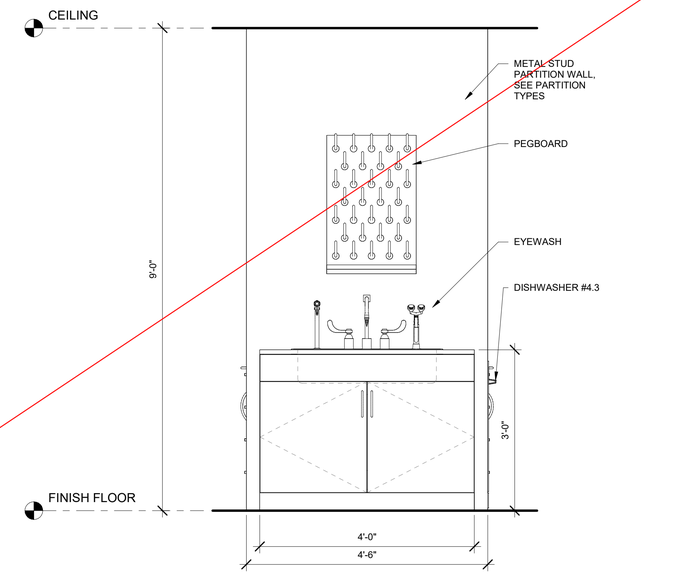
SPEC/ ALKALINITY/ TURBIDITY COUNTER ENLARGED FLOOR PLAN

3/4" = 1'-0"



1 A-1.1 **CHEMISTRY LAB SPEC/ ALKALINITY/ TURBIDITY COUNTER ELEVATION - WEST**

3/4" = 1'-0"



2 A-1.1 **CHEMISTRY LAB SPEC/ ALKALINITY/ TURBIDITY COUNTER ELEVATION - NORTH**

3/4" = 1'-0"

3 A-1.1 **CHEMISTRY LAB SPEC/ ALKALINITY/ TURBIDITY COUNTER ELEVATION - EAST**

3/4" = 1'-0"

4 A-1.1 **CHEMISTRY LAB SPEC/ ALKALINITY/ TURBIDITY COUNTER ELEVATION - SOUTH**

3/4" = 1'-0"

GENERAL NOTES:

1. REFER TO SHEETS A-1.3 TO A-1.5 FOR EQUIPMENT LIST.

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT
RICHARD D. CHONG
NO. C 8171
REN. 08/30/27
STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @
SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE.
EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

CHEMISTRY LAB SPEC/ ALKALINITY/ TURBIDITY
COUNTER ENLARGED FLOOR PLAN AND ELEVATIONS

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY:
6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

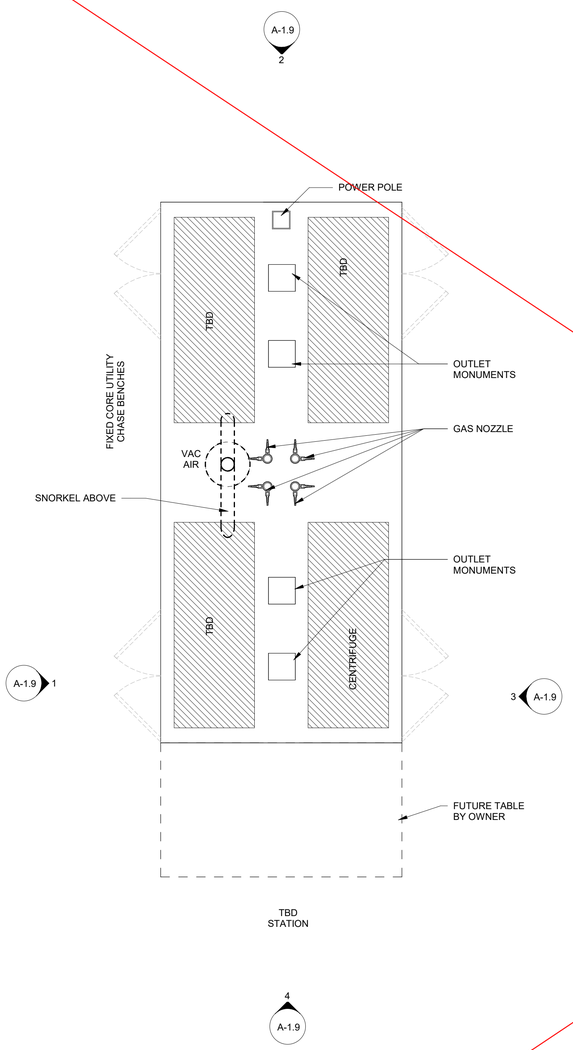
APPROVED BY:
6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 25 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-1.8

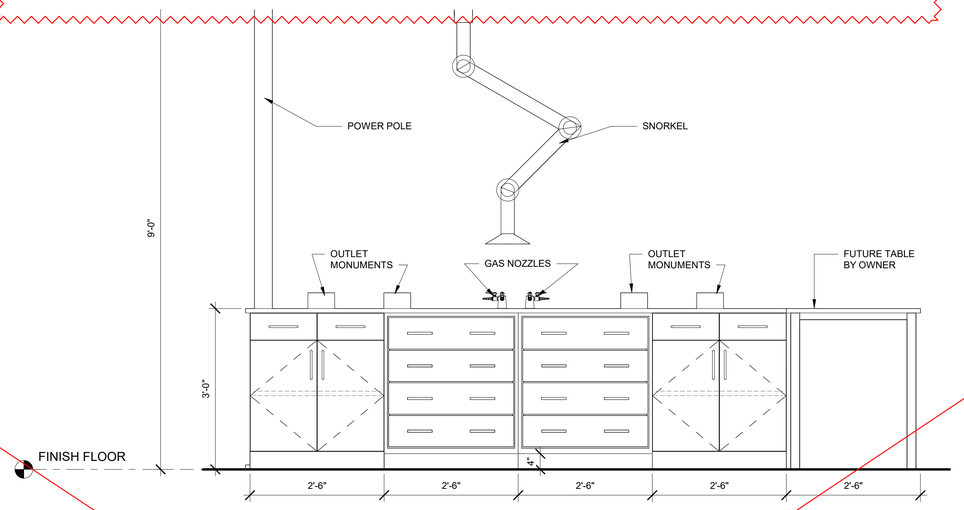
WW-00007

NOT IN SCOPE- PHASE 2



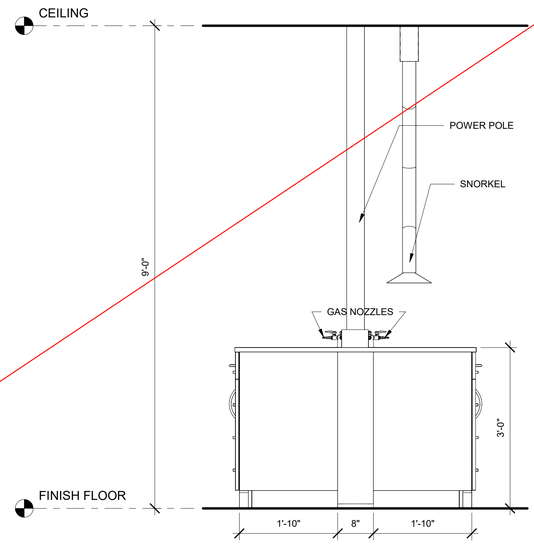
TBD COUNTER ENLARGED FLOOR PLAN

3/4" = 1'-0"



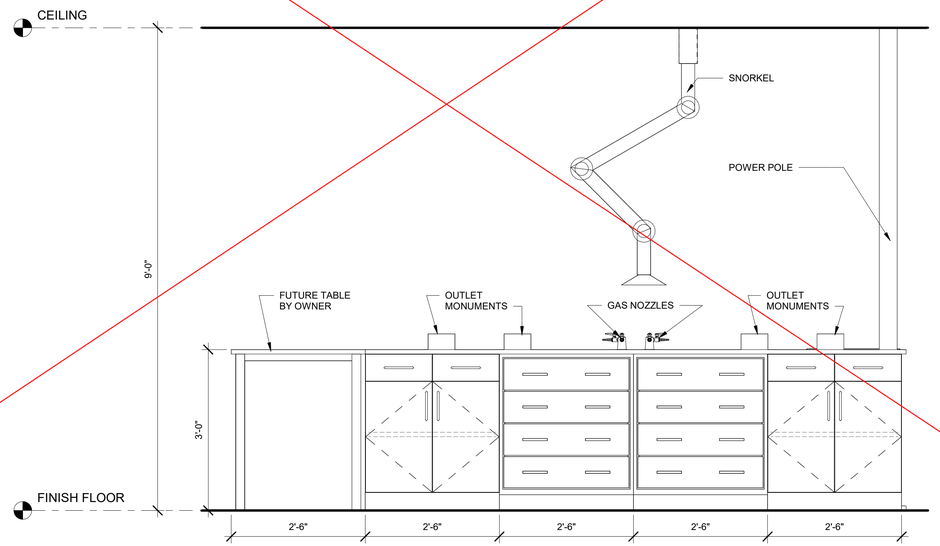
1 A-1.1 **CHEMISTRY LAB TBD COUNTER ELEVATION - WEST**

3/4" = 1'-0"



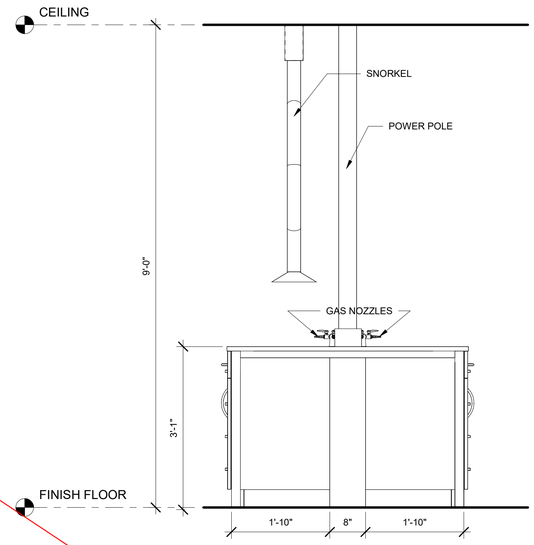
2 A-1.1 **CHEMISTRY LAB TBD COUNTER ELEVATION - NORTH**

3/4" = 1'-0"



3 A-1.1 **CHEMISTRY LAB TBD COUNTER ELEVATION - EAST**

3/4" = 1'-0"



4 A-1.1 **CHEMISTRY LAB TBD COUNTER ELEVATION - SOUTH**

3/4" = 1'-0"

GENERAL NOTES:

1. REFER TO SHEETS A-1.3 TO A-1.5 FOR EQUIPMENT LIST.

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED ARCHITECT RICHARD D. CHONG NO. C 8171 REN. 08/30/27 STATE OF CALIFORNIA

5-14-2025

CITY OF REDLANDS

Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

CHEMISTRY LAB TBD COUNTER ENLARGED FLOOR PLAN AND ELEVATIONS

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

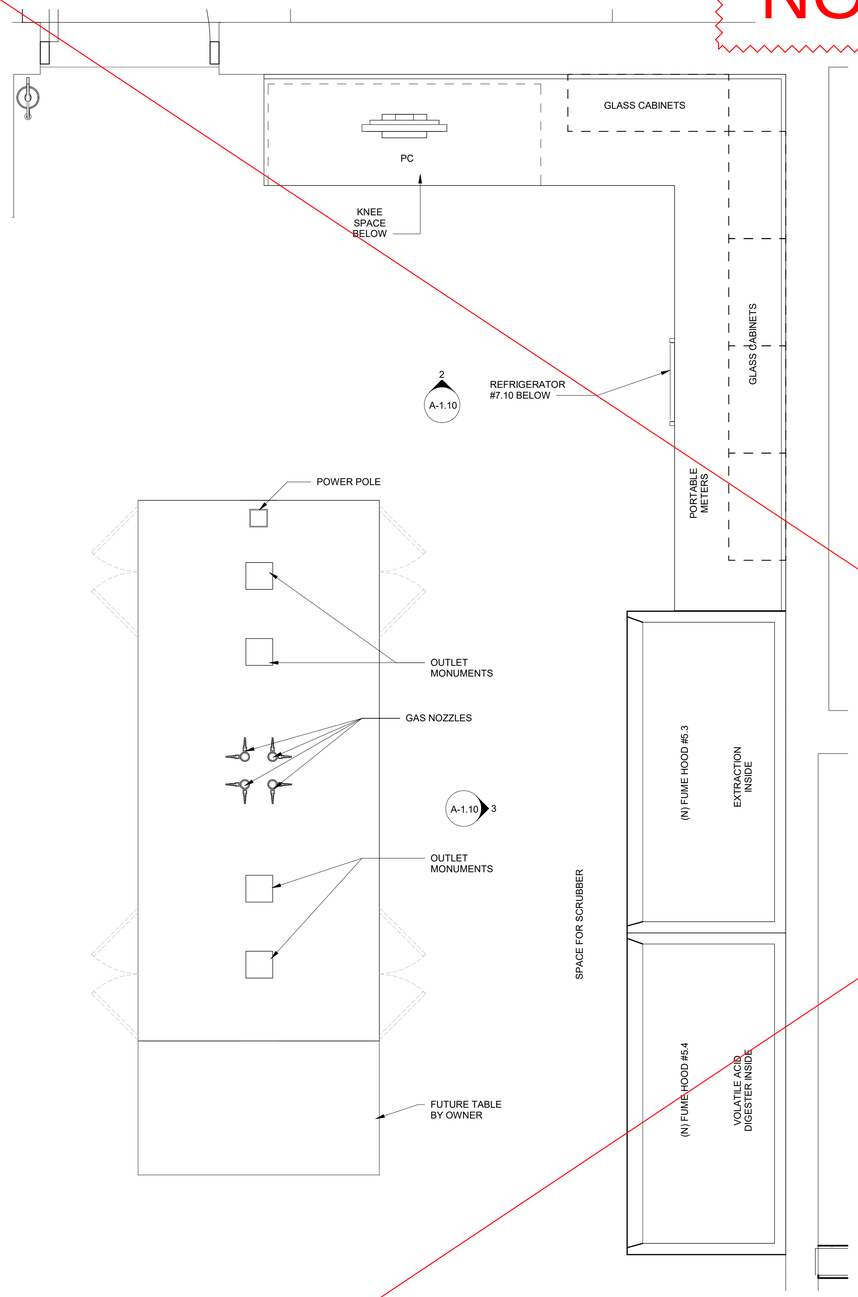
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 26 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-1.9

WW-00007

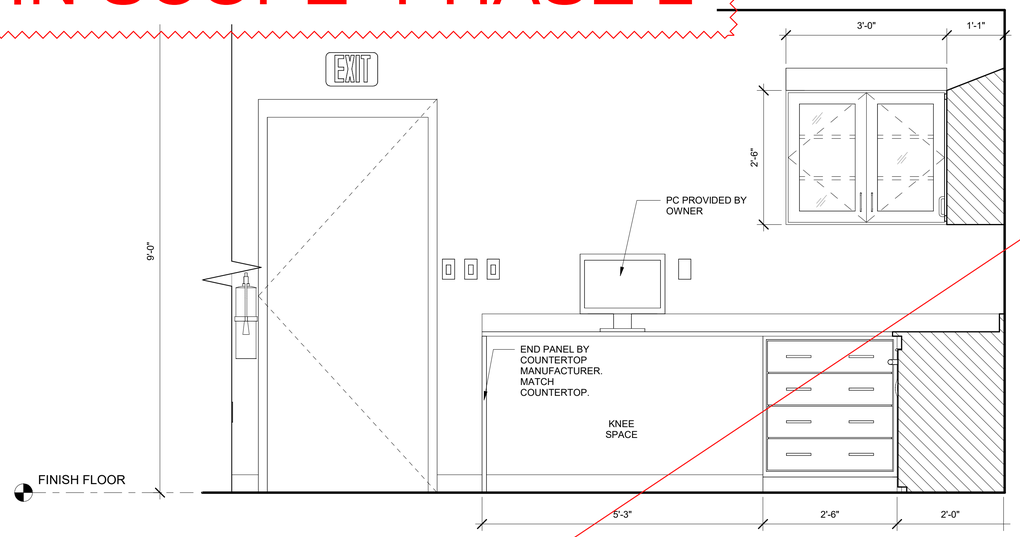
NOT IN SCOPE- PHASE 2



N

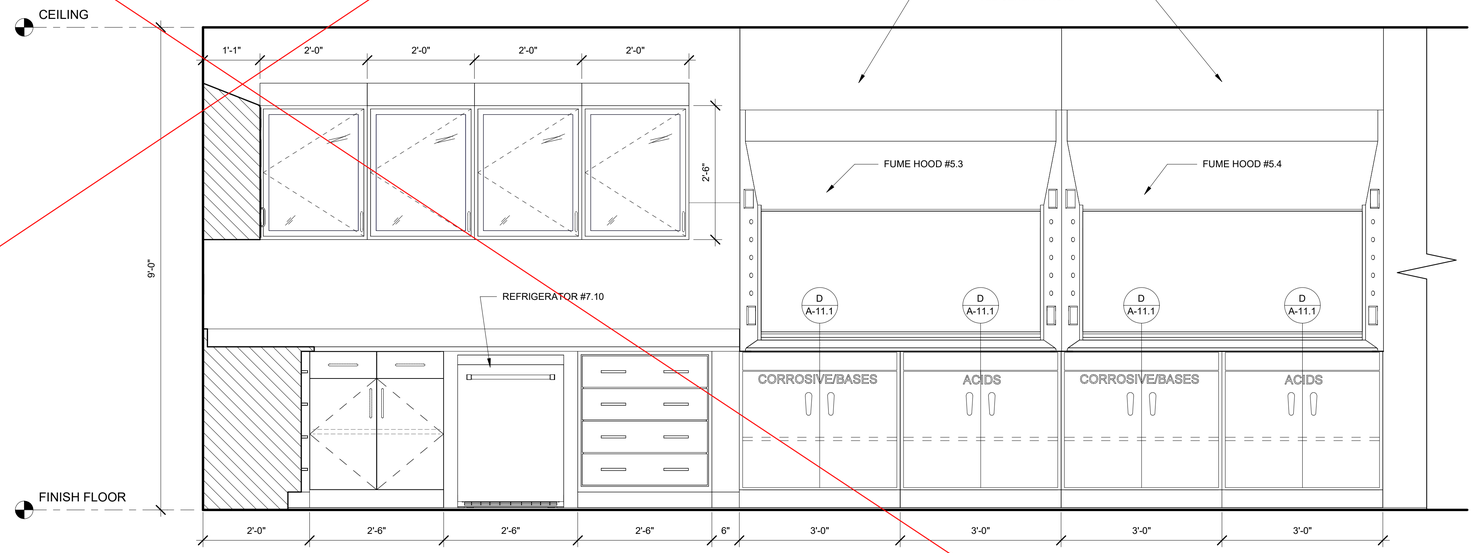
CHEMISTRY LAB N. & E. WALL COUNTERS ENLARGED FLOOR PLAN

3/4" = 1'-0"



2 A-1.1 CHEMISTRY LAB INTERIOR ELEVATION - NORTH

3/4" = 1'-0"



3 A-1.1 CHEMISTRY LAB INTERIOR ELEVATION - EAST

3/4" = 1'-0"

GENERAL NOTES:

1. NEW FUME HOODS AND BASE CABINETS SUPPLIED BY OWNER, INSTALLED BY CONTRACTOR.
2. REFER TO SHEETS A-1.3 TO A-1.5 FOR EQUIPMENT LIST.

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

RICHARD D. CHONG — No. C 31... REN. 06/30/27 — LICENSED ARCHITECT — STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

CHEMISTRY LAB NORTHERN AND EASTERN WALL COUNTERS ENLARGED FLOOR PLAN AND ELEVATIONS

Design by:	TIM KING	REVIEWED BY:	6/11/2025
Date:	MAY 2025	Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200	DATE
Checked by:	RICHARD CHONG	APPROVED BY:	6/11/2025
Date:	MAY 2025	Goutam K. Dobey, City Engineer, RCE 75646	DATE
Drawn by:	DANIEL ARTEAGA		
Date:	MAY 2025		
Checked by:	VALERIA NORATO		
Date:	MAY 2025		

Sheet 27 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

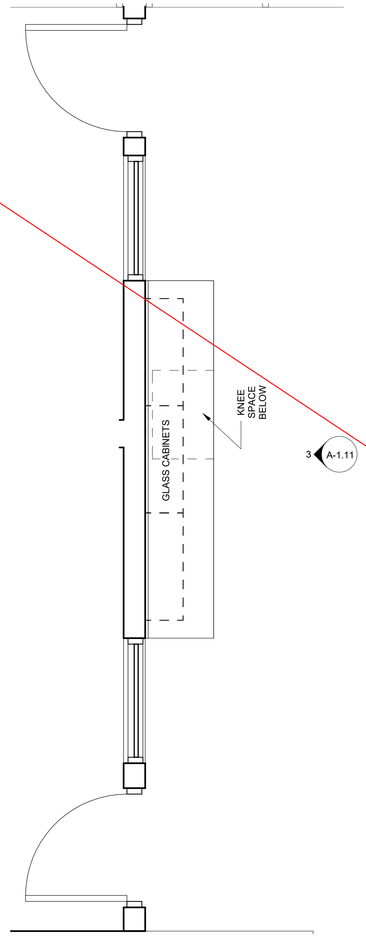
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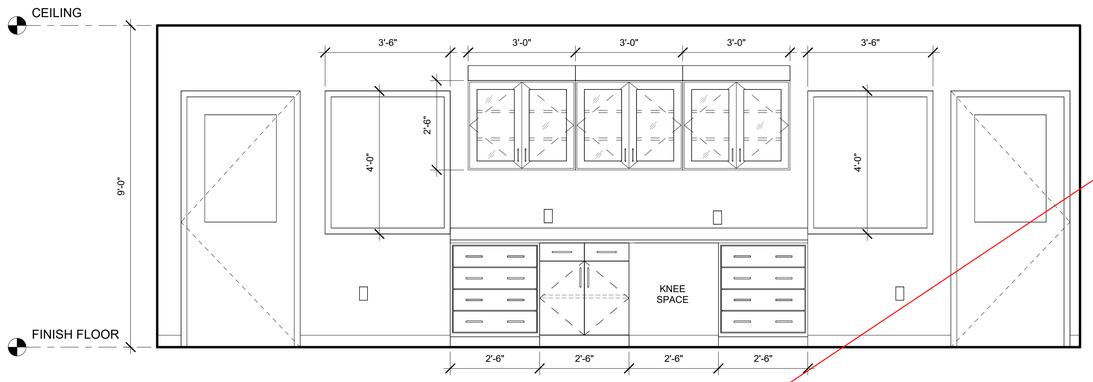
WW-00007

NOT IN SCOPE- PHASE 2

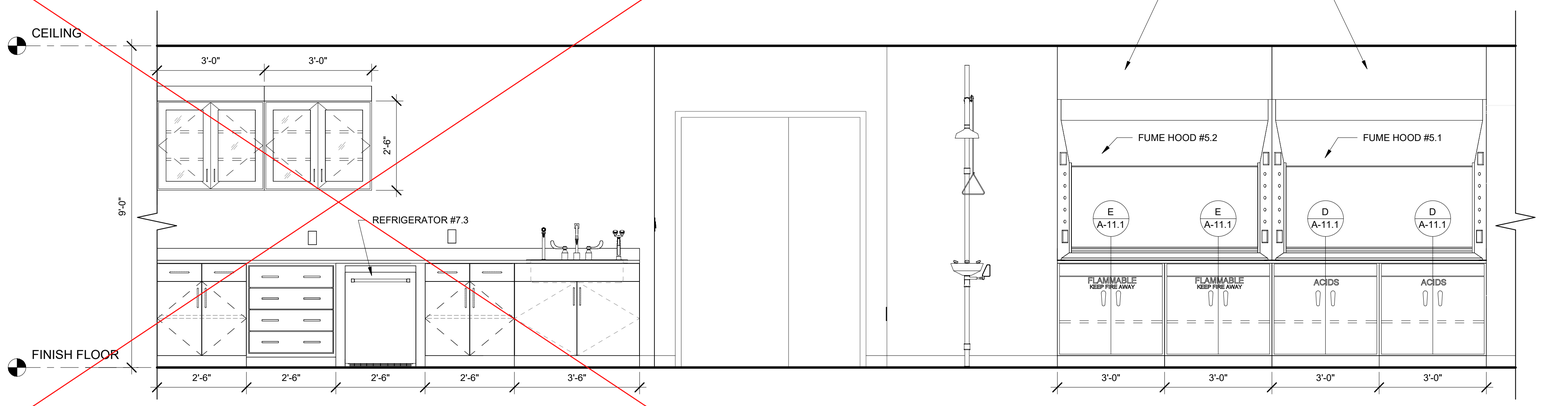
GENERAL NOTES:

1. NEW FUME HOODS AND BASE CABINETS SUPPLIED BY OWNER, INSTALLED BY CONTRACTOR.
2. REFER TO SHEETS A-1.3 TO A-1.5 FOR EQUIPMENT LIST.





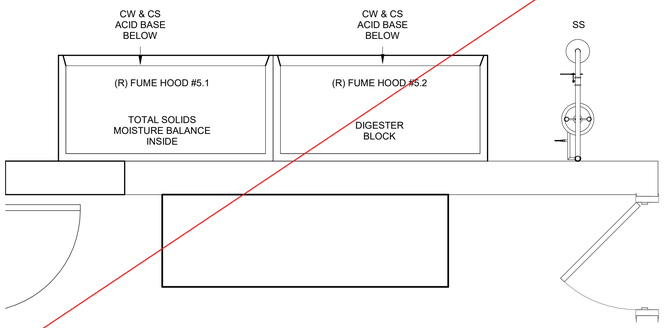
3 A-1.1 CHEMISTRY LAB INTERIOR ELEVATION - WEST
1/2" = 1'-0"

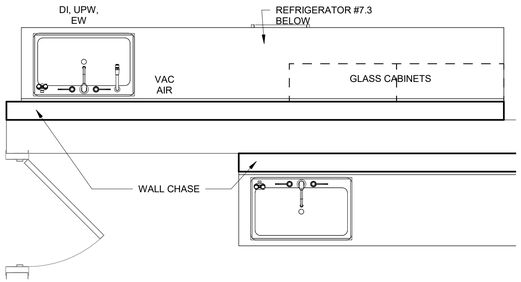


N

CHEMISTRY LAB WEST WALL COUNTER ENLARGED FLOOR PLAN
1/2" = 1'-0"

4 A-1.1 CHEMISTRY LAB INTERIOR ELEVATION - SOUTH
1/2" = 1'-0"

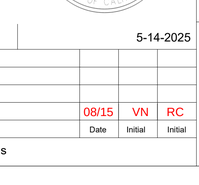




N

CHEMISTRY LAB SOUTH WALL COUNTER ENLARGED FLOOR PLAN
1/2" = 1'-0"

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200



5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN. R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

CHEMISTRY LAB WESTERN AND SOUTHERN WALL COUNTERS ENLARGED FLOOR PLAN AND ELEVATIONS

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 28 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

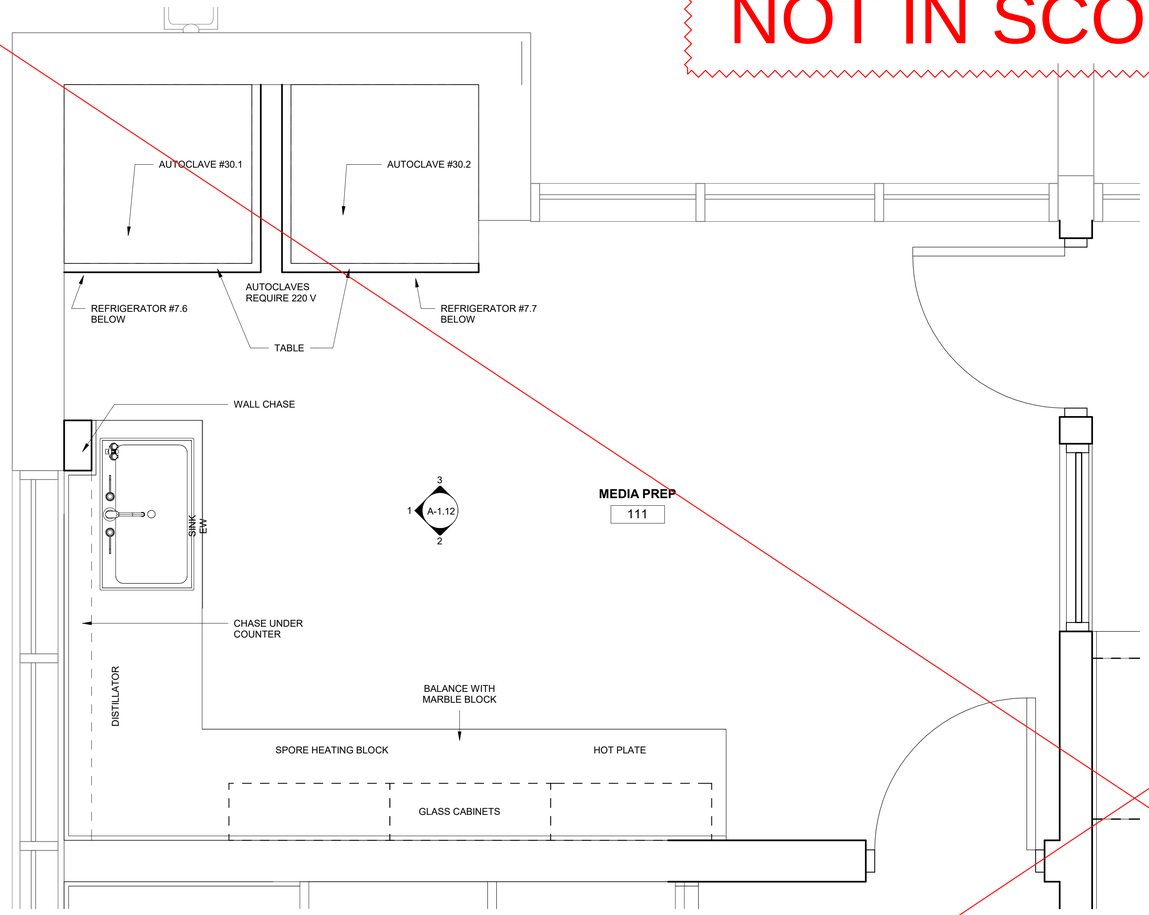
A-1.11

WW-00007

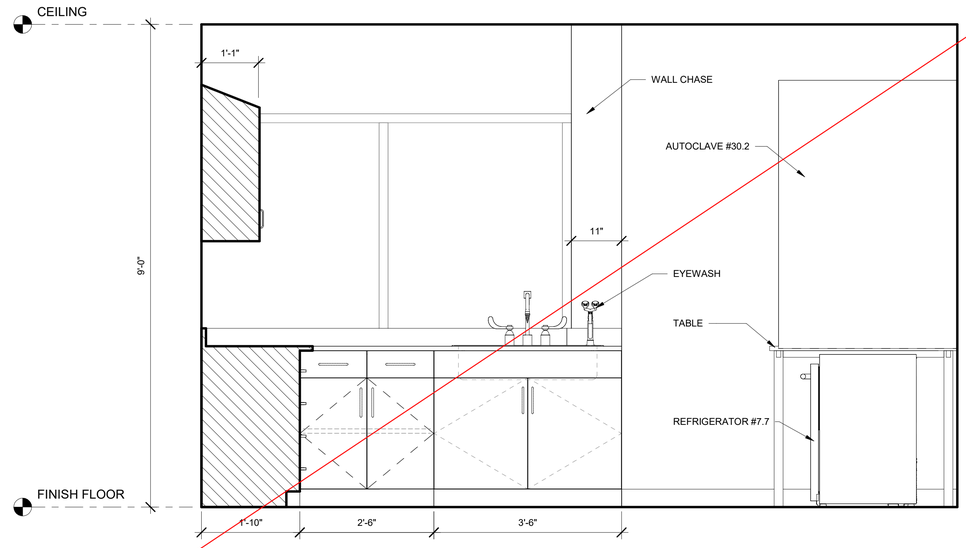
NOT IN SCOPE- PHASE 2

GENERAL NOTES:

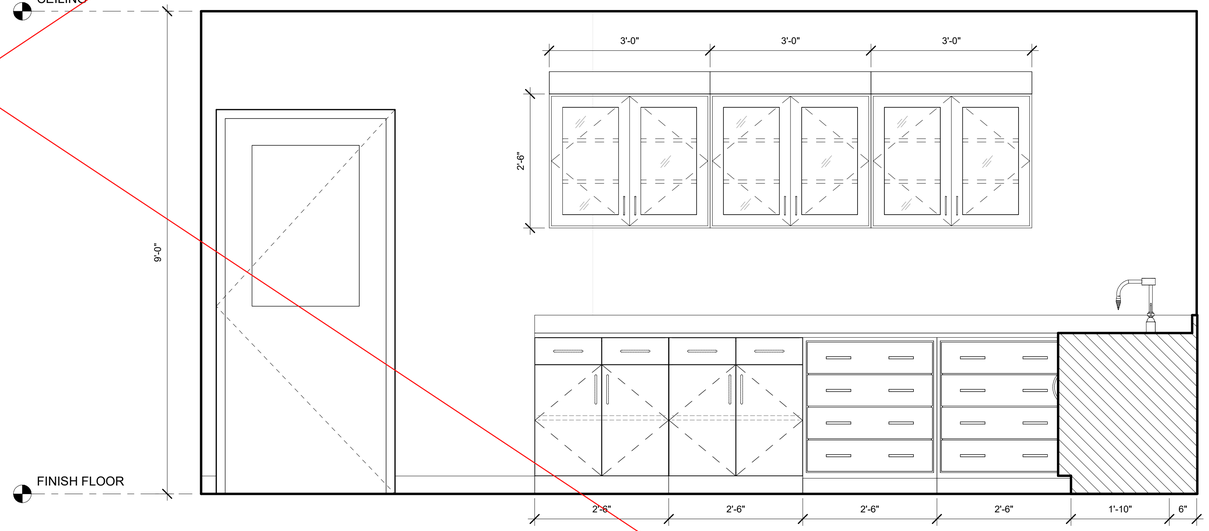
1. REFER TO SHEETS A-1.3 TO A-1.5 FOR EQUIPMENT LIST.



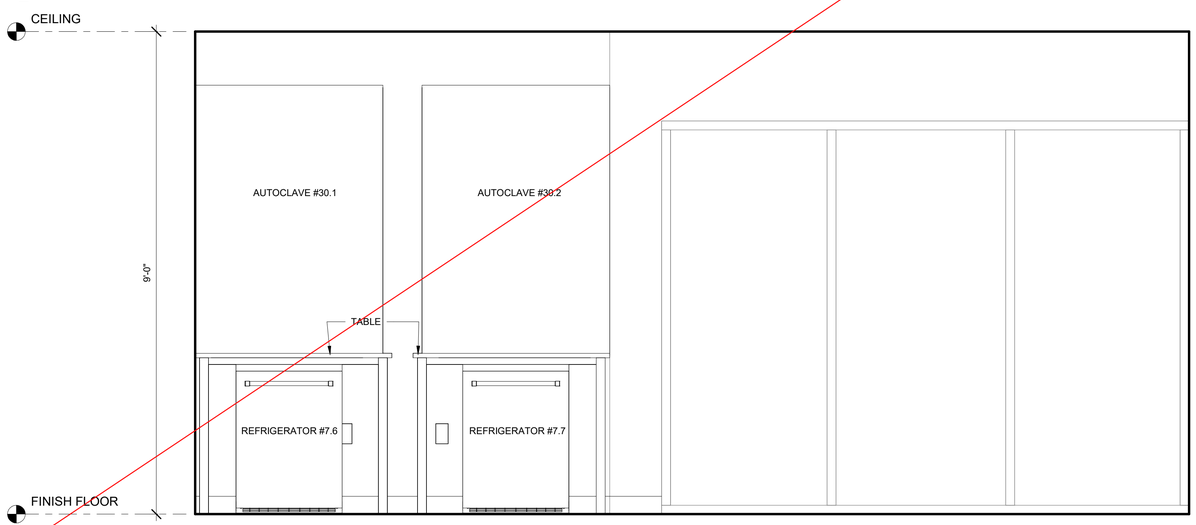
MEDIA PREP ENLARGED FLOOR PLAN
3/4" = 1'-0"



1 A-1.1 **MEDIA PREP INTERIOR ELEVATION - WEST**
3/4" = 1'-0"



2 A-1.1 **MEDIA PREP INTERIOR ELEVATION - SOUTH**
3/4" = 1'-0"



3 A-1.1 **MEDIA PREP INTERIOR ELEVATION - NORTH**
3/4" = 1'-0"

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT
RICHARD D. CHONG
NO. C 8171
REN. 08/30/27
STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

MEDIA PREP ENLARGED FLOOR PLAN AND ELEVATIONS

Design by:	TIM KING		
Date:	MAY 2025		
Checked by:	RICHARD CHONG		
Date:	MAY 2025		
Drawn by:	DANIEL ARTEAGA		
Date:	MAY 2025		
Checked by:	VALERIA NORATO		
Date:	MAY 2025		

REVIEWED BY:
6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY:
6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 29 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

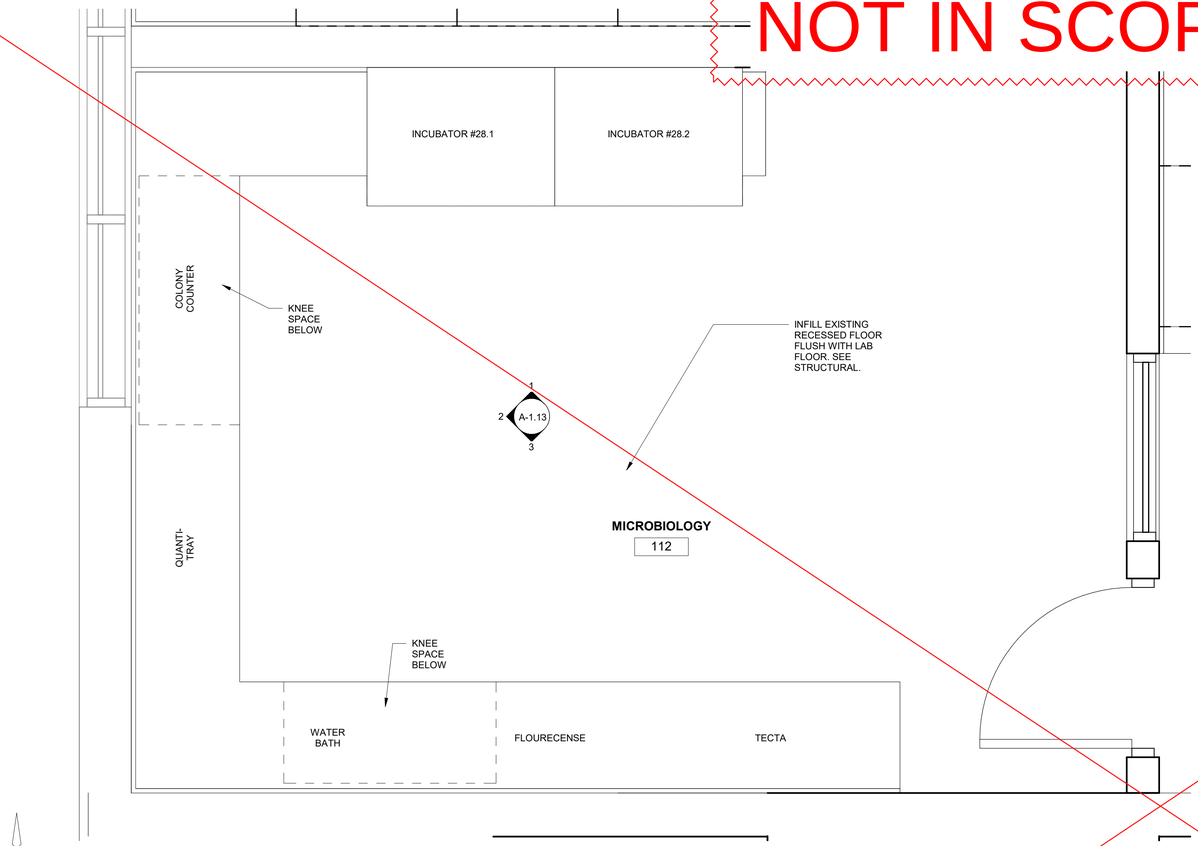
A-1.12

WW-00007

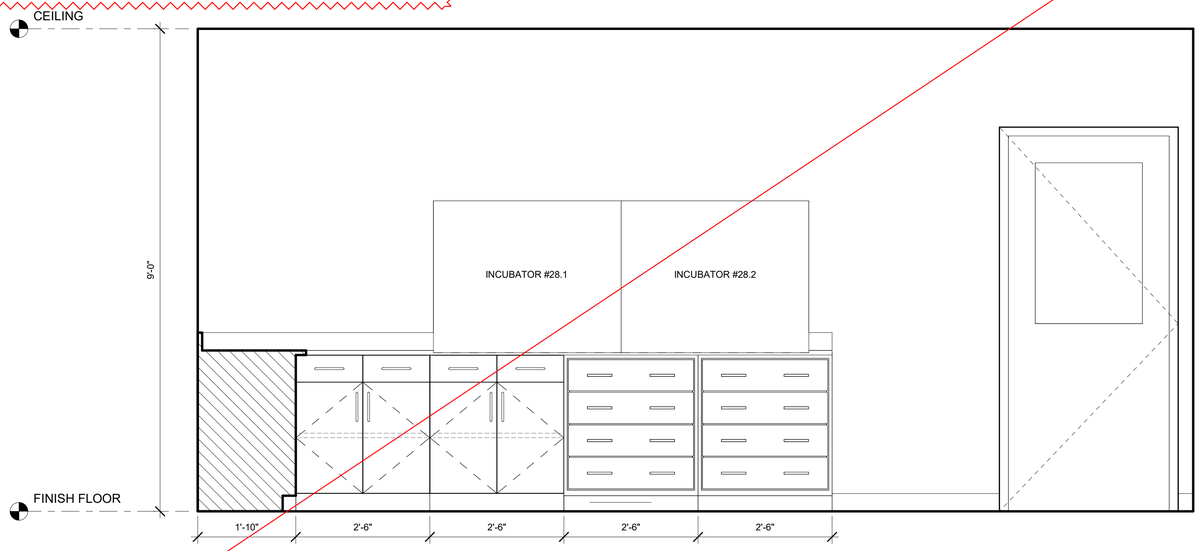
NOT IN SCOPE- PHASE 2

GENERAL NOTES:

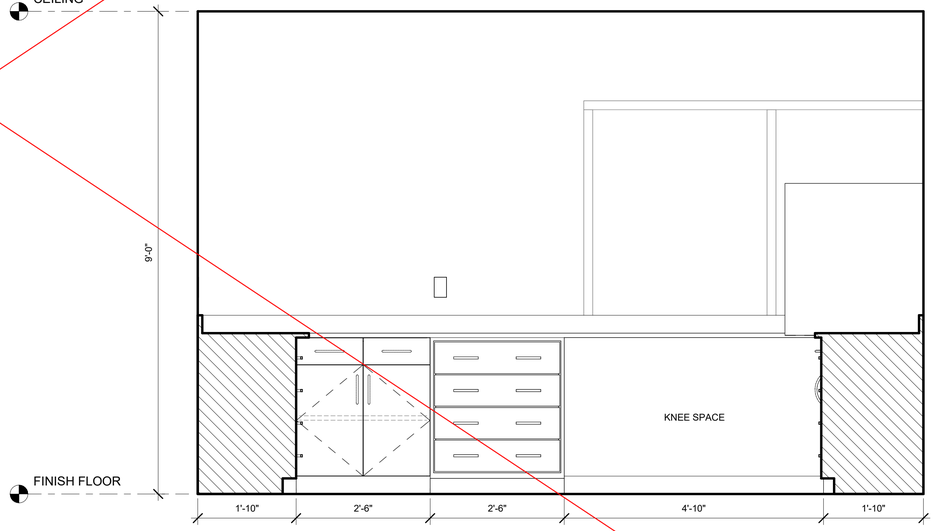
1. REFER TO SHEETS A-1.3 TO A-1.5 FOR EQUIPMENT LIST.



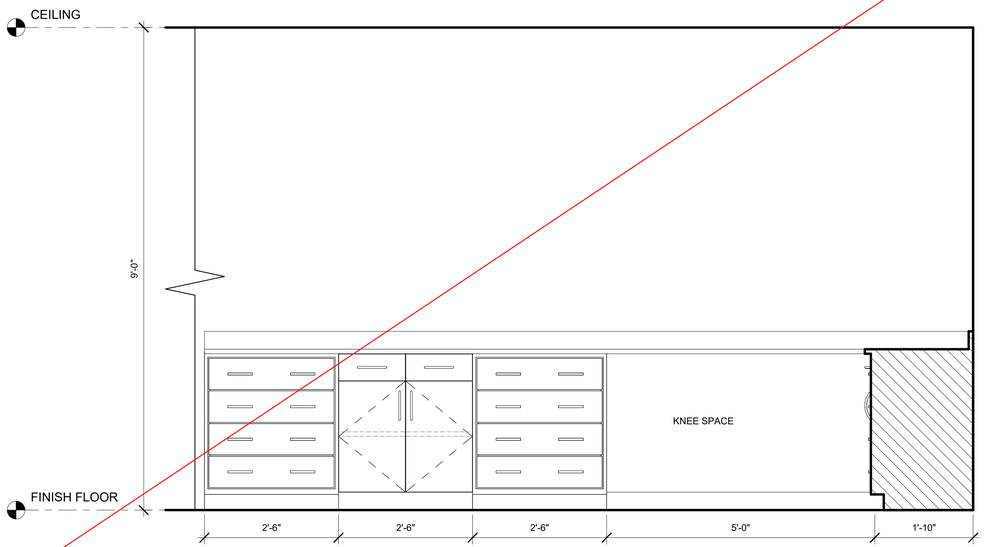
MICROBIOLOGY ENLARGED FLOOR PLAN
3/4" = 1'-0"



1 A-1.1 **MICROBIOLOGY INTERIOR ELEVATION - NORTH**
3/4" = 1'-0"



2 A-1.1 **MICROBIOLOGY INTERIOR ELEVATION - WEST**
3/4" = 1'-0"



3 A-1.1 **MICROBIOLOGY INTERIOR ELEVATION - SOUTH**
3/4" = 1'-0"

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT RICHARD D. CHONG C-31777 REN: 08/30/27 STATE OF CALIFORNIA

5-14-2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

MICROBIOLOGY ENLARGED FLOOR PLAN AND ELEVATIONS

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 30 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

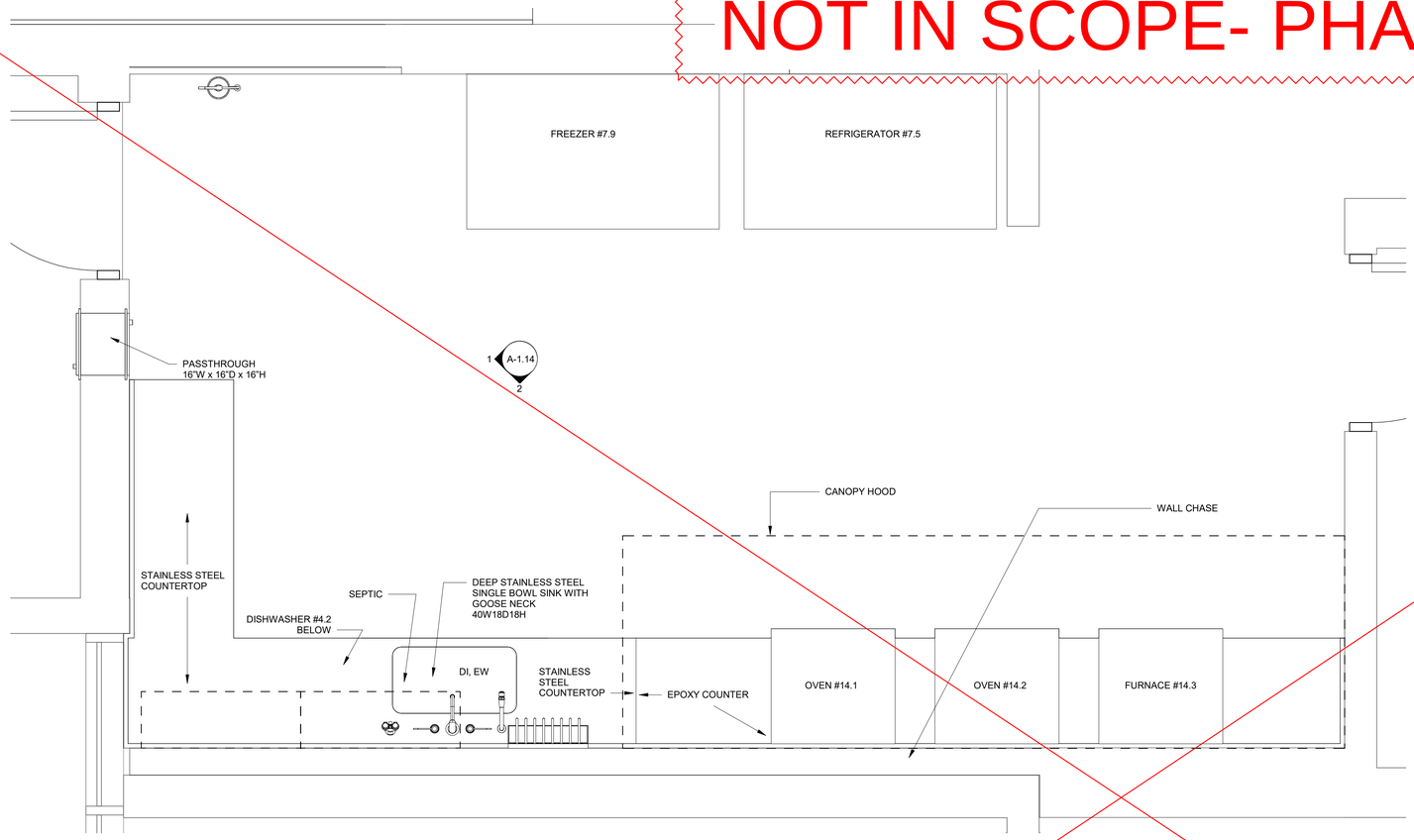
A-1.13

WW-00007

NOT IN SCOPE- PHASE 2

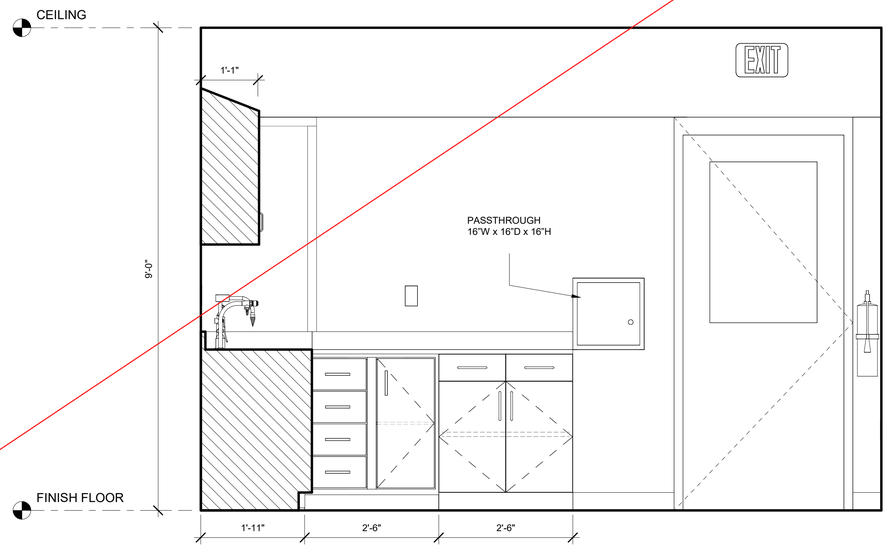
GENERAL NOTES:

1. REFER TO SHEETS A-1.3 TO A-1.5 FOR EQUIPMENT LIST.

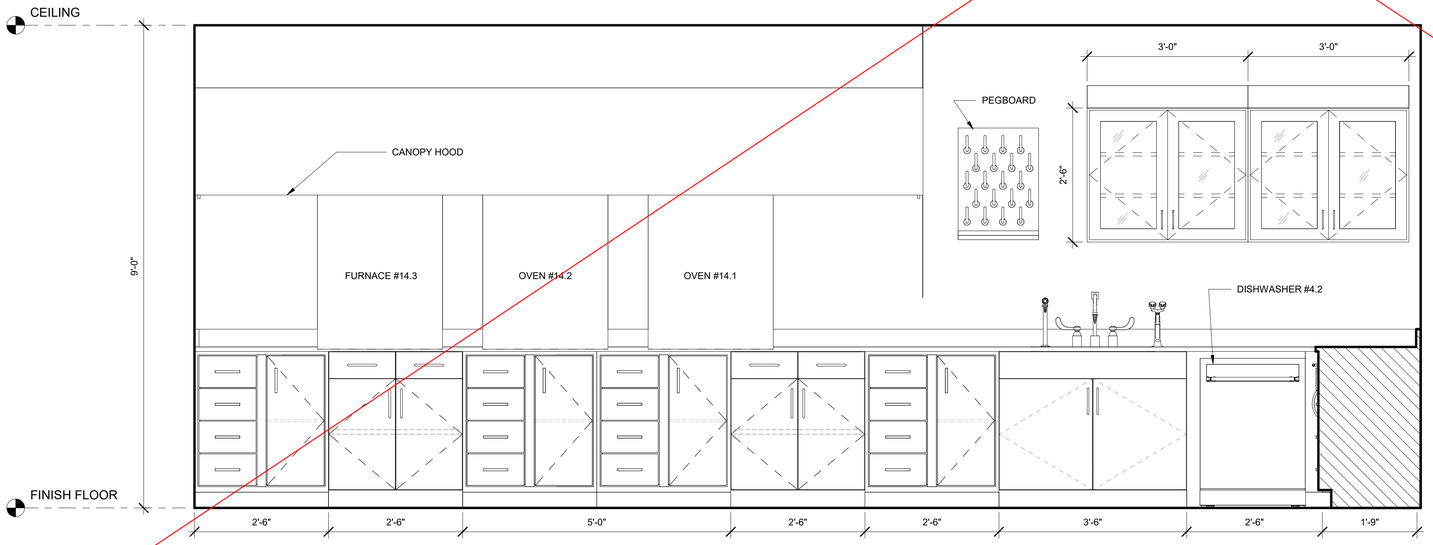


N

SAMPLE RECEIVING AND INDUSTRIAL WASTE STATION ENLARGED FLOOR PLAN
3/4" = 1'-0"



1 A-1.1 **SAMPLE RECEIVING AND INDUSTRIAL WASTE STATION INTERIOR ELEVATION - WEST**
3/4" = 1'-0"



2 A-1.1 **SAMPLE RECEIVING AND INDUSTRIAL WASTE STATION INTERIOR ELEVATION - SOUTH**
3/4" = 1'-0"

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT
RICHARD D. CHONG
REN. 08/30/27
STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

SAMPLE RECEIVING AND INDUSTRIAL WASTE STATION ENLARGED FLOOR PLAN AND ELEVATIONS

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY:
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 — 6/11/2025 DATE

APPROVED BY:
Goutam K. Dobey, City Engineer, RCE 75646 — 6/11/2025 DATE

Sheet 31 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

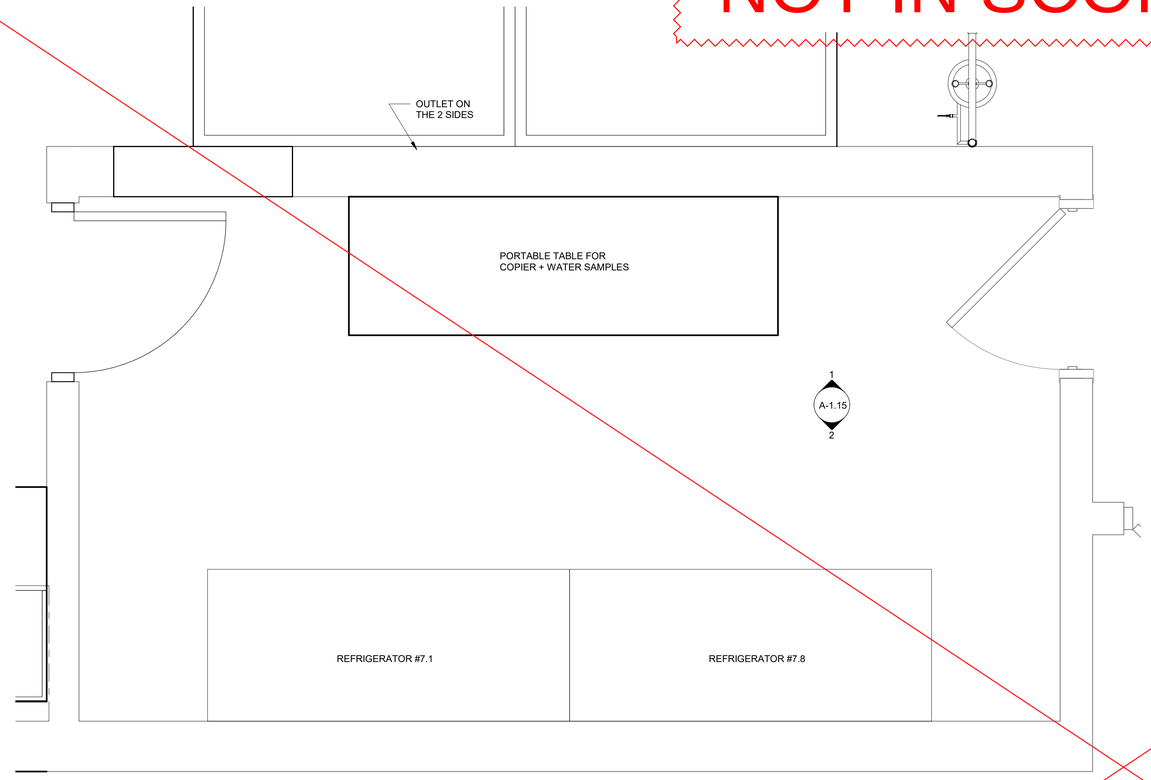
A-1.14

WW-00007

NOT IN SCOPE- PHASE 2

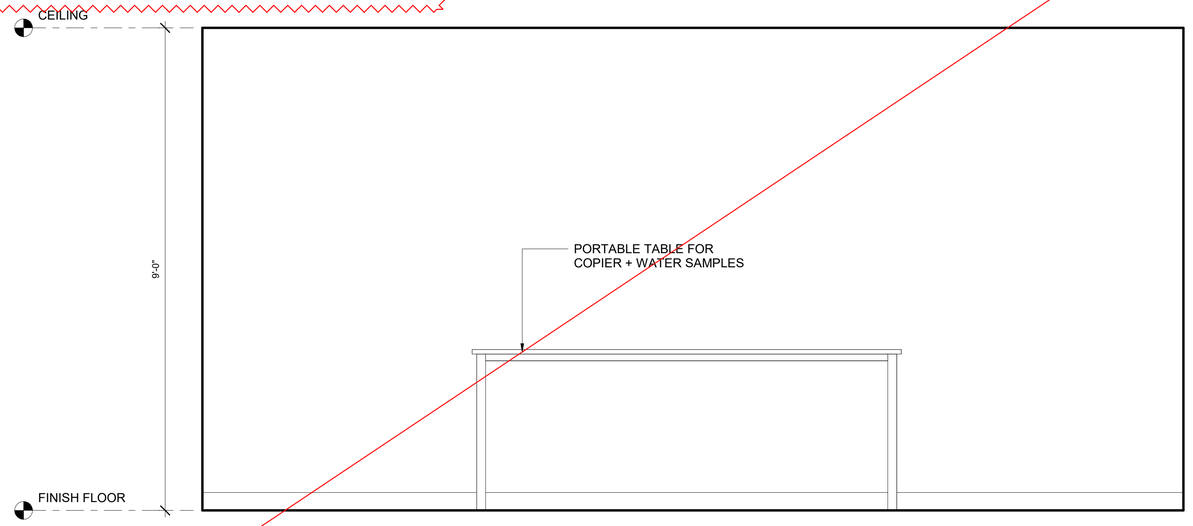
GENERAL NOTES:

1. REFER TO SHEETS A-1.3 TO A-1.5 FOR EQUIPMENT LIST.

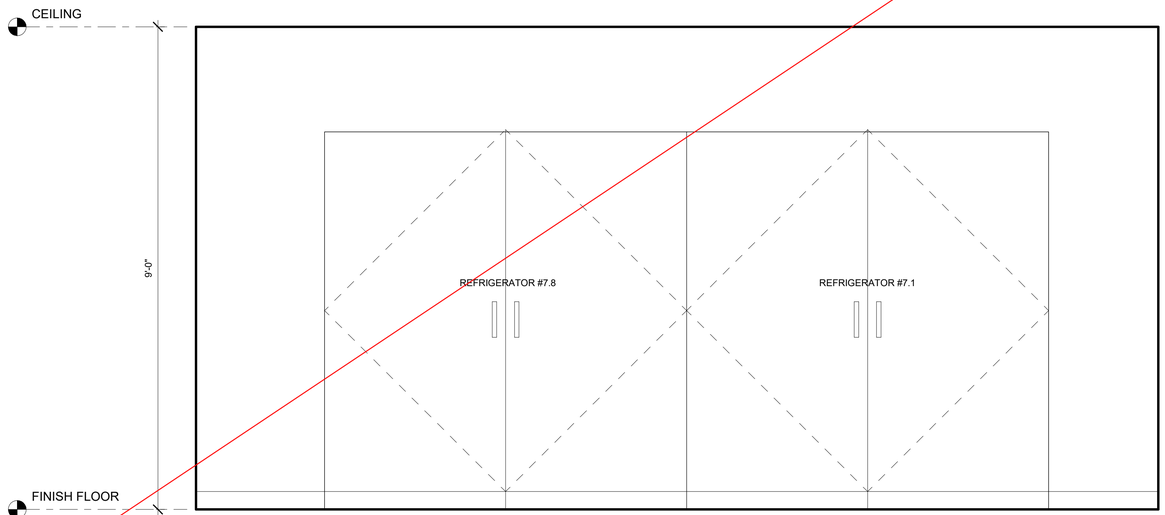


N

SAMPLE RETENTION ENLARGED FLOOR PLAN
3/4" = 1'-0"



1 A-1.1 **SAMPLE RETENTION INTERIOR ELEVATION - NORTH**
3/4" = 1'-0"



2 A-1.1 **SAMPLE RETENTION INTERIOR ELEVATION - SOUTH**
3/4" = 1'-0"

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT
RICHARD D. CHONG
No. 8174
REN: 08/30/27
STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

SAMPLE RETENTION ENLARGED FLOOR PLAN AND ELEVATIONS

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 32 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

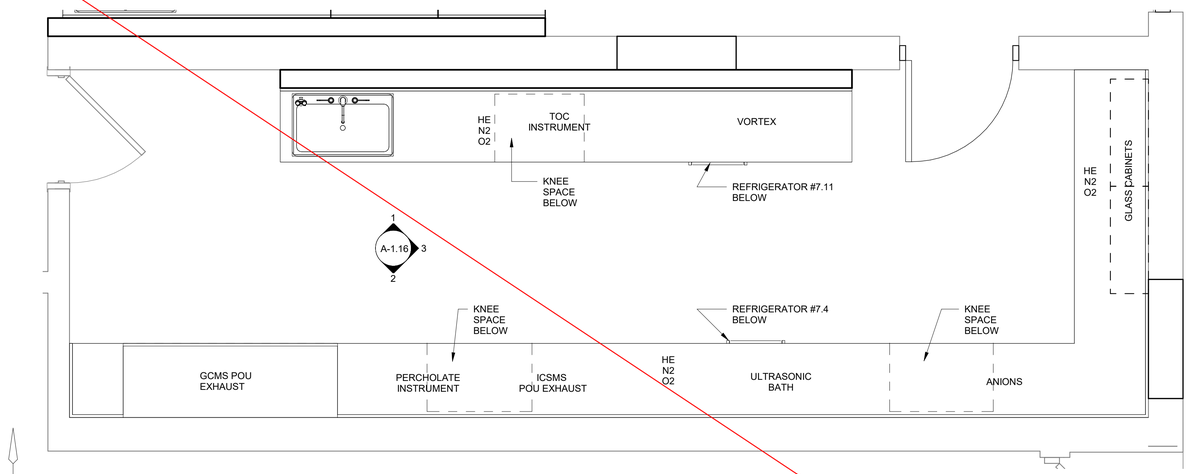
A-1.15

WW-00007

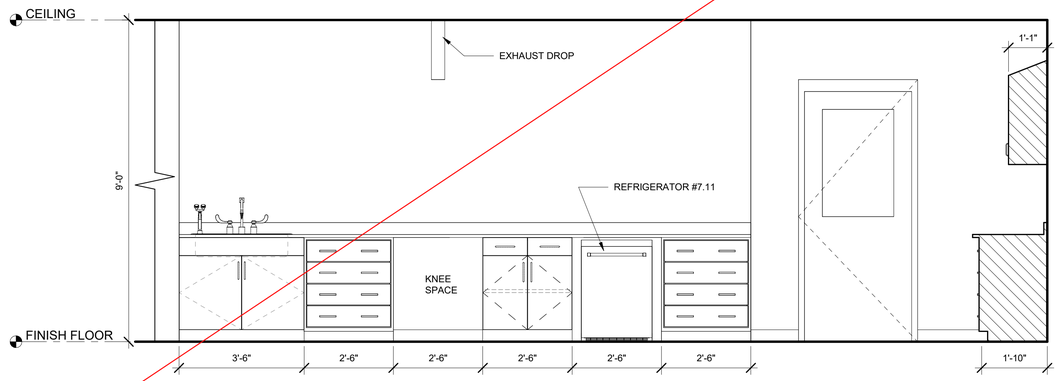
NOT IN SCOPE- PHASE 2

GENERAL NOTES:

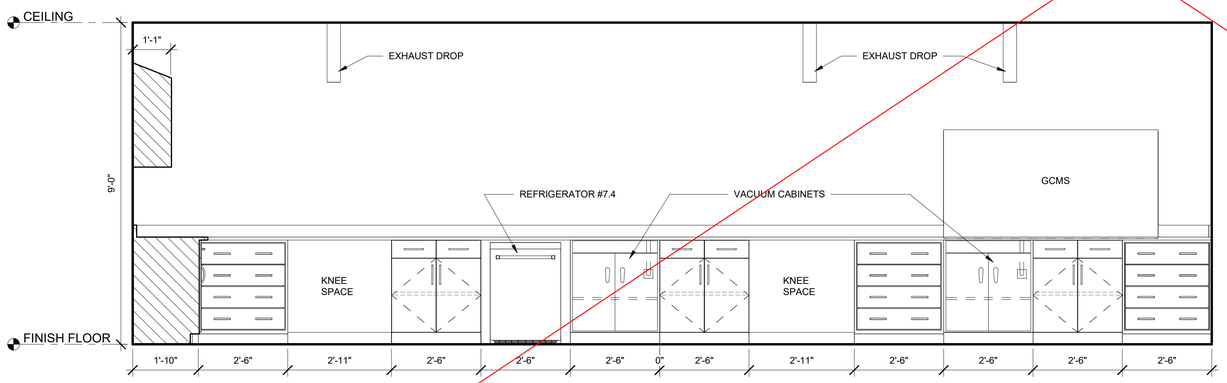
1. REFER TO SHEETS A-1.3 TO A-1.5 FOR EQUIPMENT LIST.



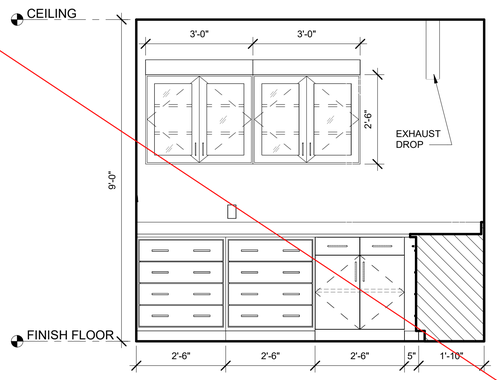
INSTRUMENT LAB ENLARGED FLOOR PLAN
1/2" = 1'-0"



1 A-1.1 **INSTRUMENT LAB INTERIOR ELEVATION - NORTH**
1/2" = 1'-0"



2 A-1.1 **INSTRUMENT LAB INTERIOR ELEVATION - SOUTH**
1/2" = 1'-0"



3 A-1.1 **INSTRUMENT LAB INTERIOR ELEVATION - EAST**
1/2" = 1'-0"

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT
RICHARD D. CHONG
No. 8174
REN. 08/30/27
STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

INSTRUMENT LAB ENLARGED FLOOR PLAN AND ELEVATIONS

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 33 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

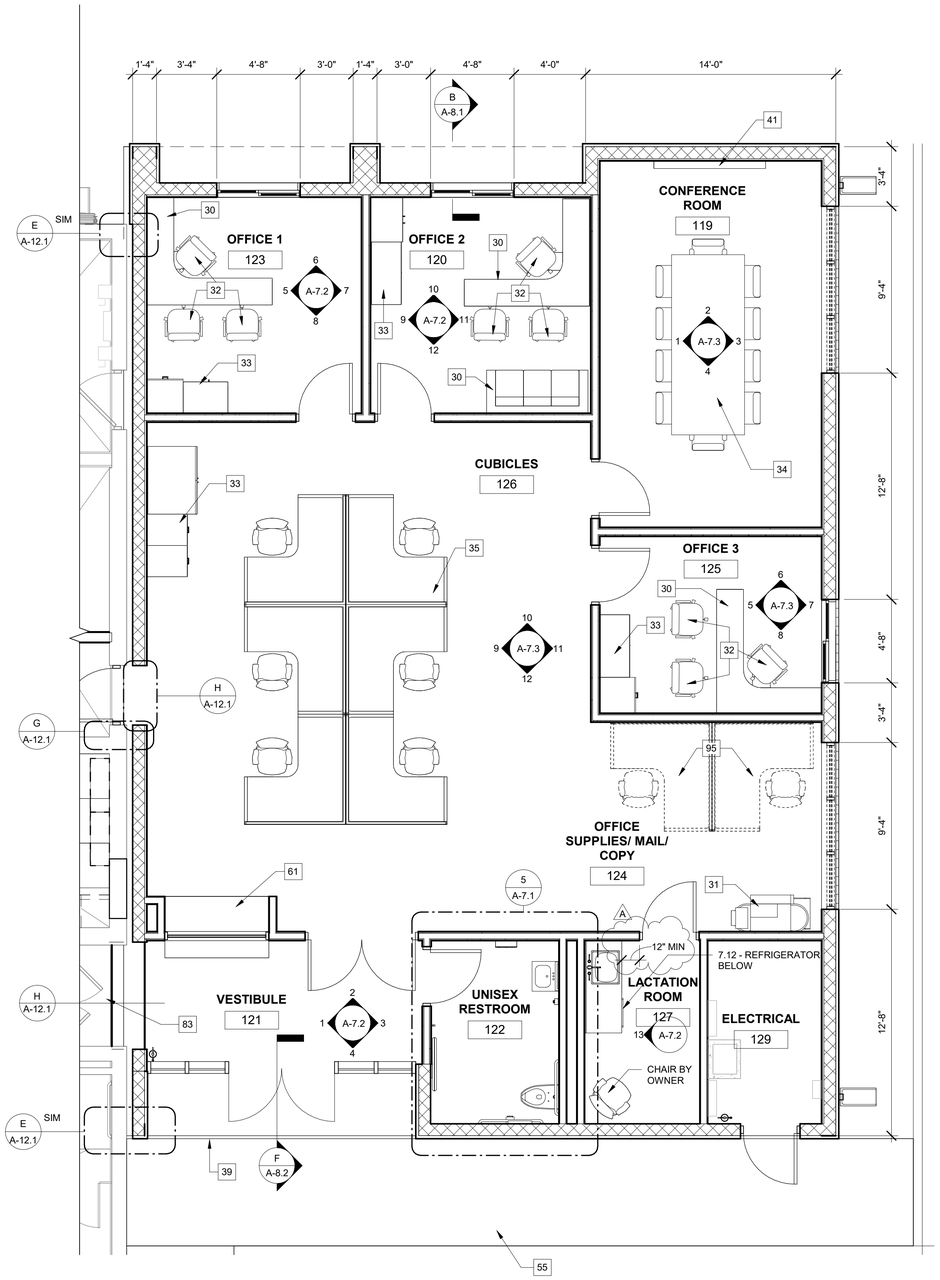
A-1.16

WW-00007

GENERAL NOTES:

1. ALL PORTABLE FURNITURE, CUBICLES, AND OTHER SYSTEM FURNITURE SHOWN IN THE NEW ADDITION ARE (NOT IN CONTRACT) NIC AND WILL BE INSTALLED BY OWNER.
2. FURNITURE LAYOUT IS SHOWN FOR PLANNING PURPOSES ONLY.
3. ~~REFER TO SHEETS A-1.5 TO A-1.5 FOR EQUIPMENT LIST.~~

KEYNOTE LEGEND	
KEY VALUE	KEYNOTE TEXT
30	FURNITURE BY OWNER
31	COPIER BY OWNER
32	CHAIR BY OWNER
33	CABINET BY OWNER
34	CONFERENCE ROOM TABLE AND CHAIRS, BY OWNER
35	CUBICLE BY OWNER
39	BUILDING SOFFIT ABOVE
41	PROJECTOR SCREEN
55	NEW SIDEWALK, SEE "C" SHEETS
61	ADA COUNTER
83	FLOOR EXPANSION JOINT
95	FUTURE CUBICLE BY OWNER



N

1 ENLARGED FLOOR PLAN - ADDITION AREA

A-1.1 — 1/4" = 1'-0"

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT — RICHARD D. CHONG — NO. C 31777 — REN. 08/30/27 — STATE OF CALIFORNIA

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

ENLARGED FLOOR PLAN OF ADDITION WITH FURNITURE & CUBICLE LAYOUT

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

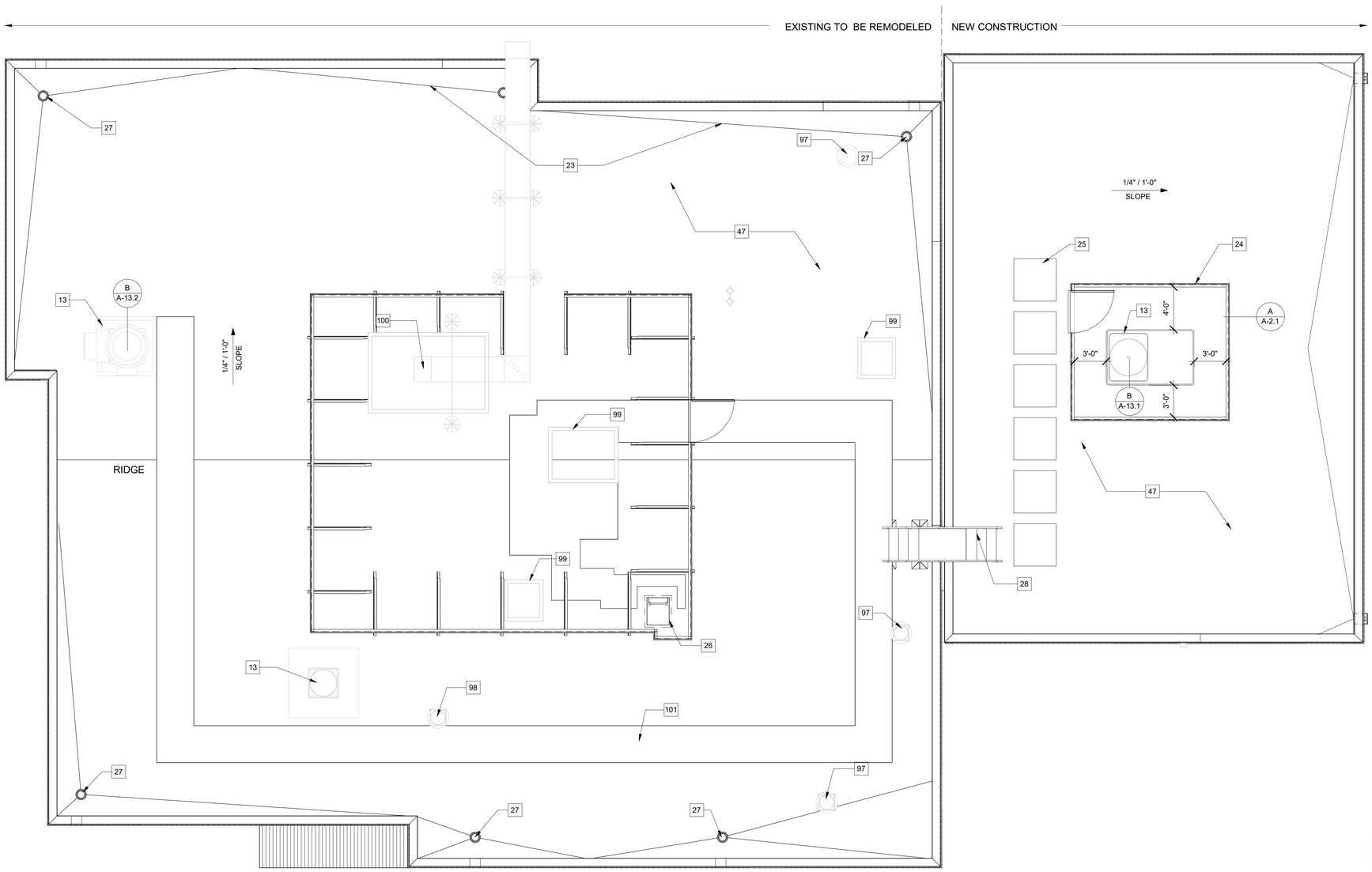
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 34 of 126 Sheets
Scale Horiz. AS.SHOWN
Vert. AS.SHOWN

A-1.17

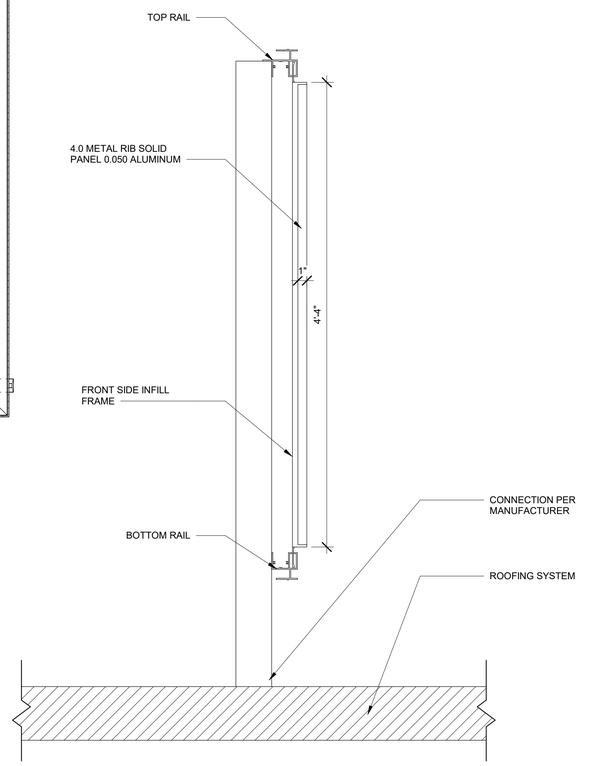
WW-00007



N ROOF PLAN
3/16" = 1'-0"

KEYNOTE LEGEND	
KEY VALUE	KEYNOTE TEXT
13	HVAC EQUIPMENT, SEE MECHANICAL
23	CRICKET LINES
24	ROOF EQUIPMENT SCREEN
25	WALKWAY
26	EXISTING ROOF ACCESS HATCH, TO REMAIN
27	EXISTING ROOF DRAIN, TO REMAIN
28	ROOF STAIR WITH WALK THROUGH EXTENSION, SEE "S"SHEETS
47	PVC ROOFING SYSTEM OVER RIGID INSULATION R-30 CI (MIN)
97	EXISTING FAN TO REMAIN, SEE MECHANICAL
98	EXISTING DUCT TO REMAIN, SEE MECHANICAL
99	CAP EXISTING HVAC CURB, SEE MECHANICAL
100	ATTACH DUCT TO EXISTING DUCT WORK AND CAP CURB, SEE MECHANICAL
101	NEW WALKING PAD

* NEW CONSTRUCTION AND REROOF FOR EXISTING BUILING ONLY FOR PHASE 1 INCLUDING WALKING PADS AND ROOF STAIRS.
* SEE HVAC SHEETS FOR PHASE 1 WORK, CHANGES ON EXISTING ROOF SCREEN NOT IN SCOPE.



A ROOF SCREEN DETAIL
1 1/2" = 1'-0"

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT
RICHARD D. CHONG
No. C 31...
REN. 08/30/27
STATE OF CALIFORNIA

5-14-2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

ROOF PLAN

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

Design by: TIM KING
Date: MAY 2025
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Checked by: VALERIA NORATO
Date: MAY 2025

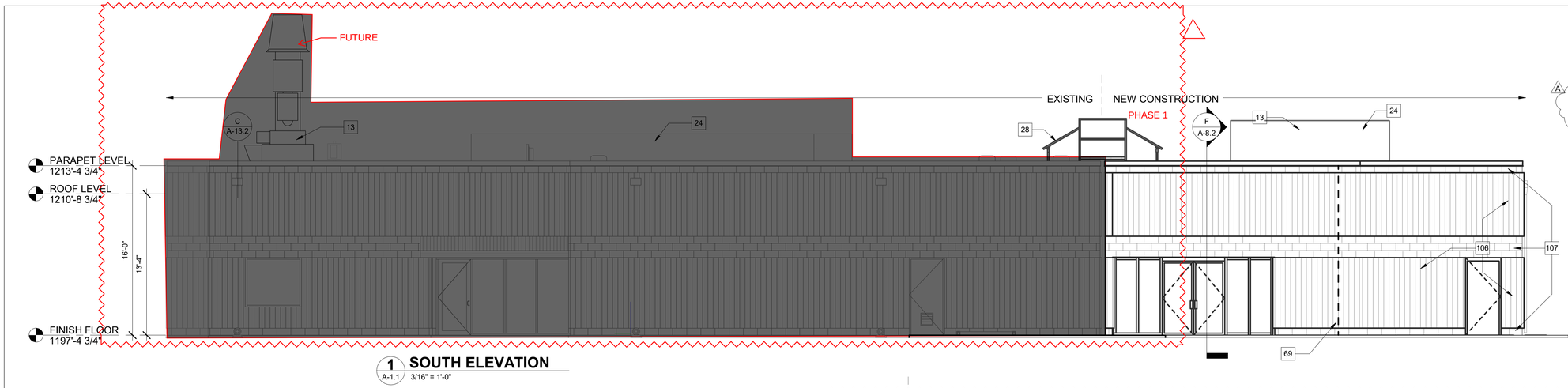
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 35 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-2.1

WW-00007

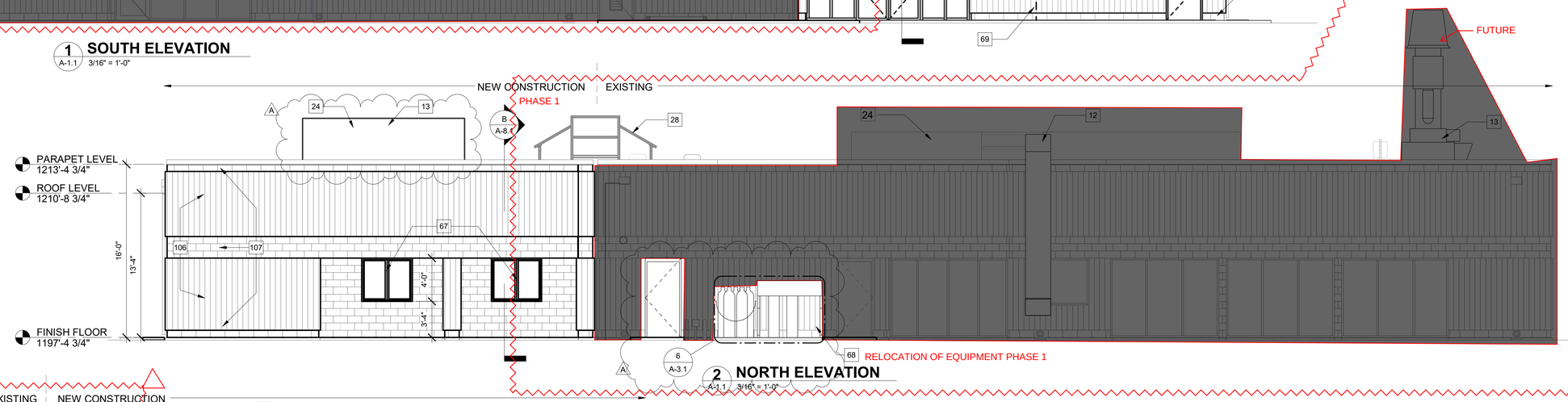


1 SOUTH ELEVATION
A-1.1 3/16" = 1'-0"

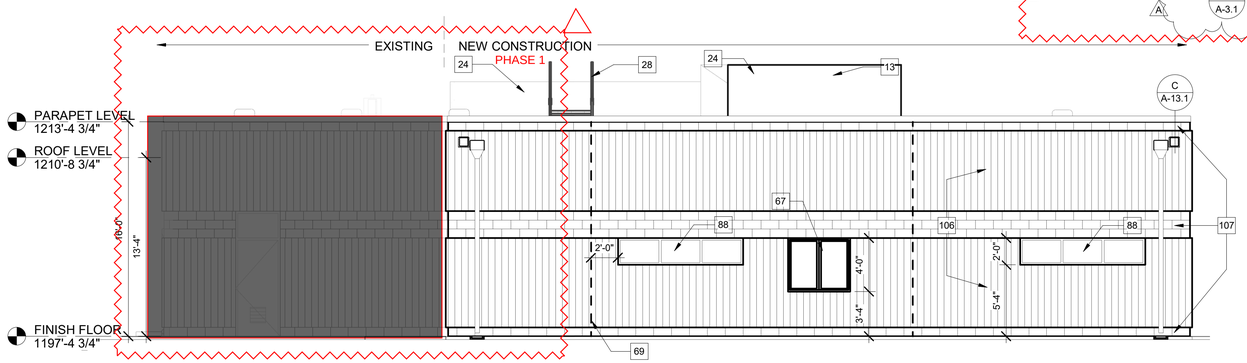
KEYNOTE LEGEND	
KEY VALUE	KEYNOTE TEXT
12	HVAC DUCTWORK, SEE MECHANICAL
13	HVAC EQUIPMENT, SEE MECHANICAL
14	8" HIGH CONCRETE CURB, TYP. SEE "S" SHEETS
15	HOLLOW METAL DOOR AND FRAME(SEE SCHD
24	ROOF EQUIPMENT SCREEN, TO EXTEND 6-INCH BEYOND THE HEIGHT OF THE APPROVED HVAC EQUIPMENT
28	ROOF STAIR WITH WALK THROUGH EXTENSION, SEE "S" SHEETS
46	PASS-THROUGH
67	ALUMINUM SLIDING WINDOW, SEE SCHD
68	COORDINATE RELOCATION OF EXISTING TANK STORAGE WITH OWNER
69	MASONRY CONTROL JOINT, SEE "S" SHEETS
88	ALUMINUM WINDOW, SEE SCHD
106	FLUTED BLOCK FINISH TO MATCH EXISTING
107	SPLIT FACE BLOCK FINISH TO MATCH EXISTING

LEGEND

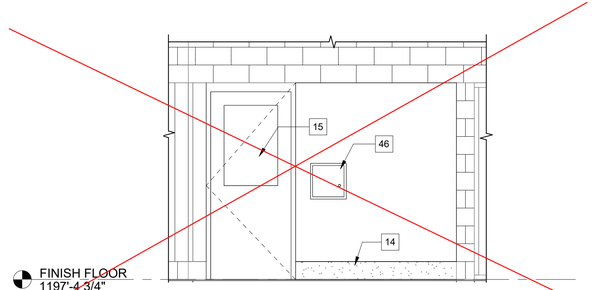
NOT IN SCOPE



2 NORTH ELEVATION
A-1.1 3/16" = 1'-0"



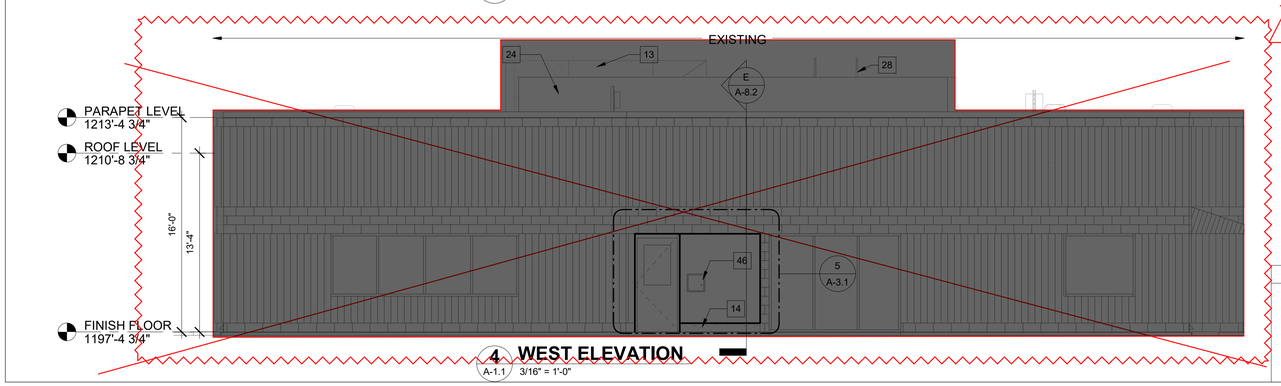
3 EAST ELEVATION
A-1.1 3/16" = 1'-0"



5 ENLARGED ENTRY TO SAMPLE RECEIVING AND INDUSTRIAL WASTE STATION
A-3.1 3/8" = 1'-0"



6 GAS TANK STORAGE
– NTS



4 WEST ELEVATION
A-1.1 3/16" = 1'-0"

GENERAL NOTE:

1. 8 CYLINDERS ON SITE, 4 - HELIUM AND 4 - OXYGEN

   CY- HE UHP200 - CYL HELIUM UHP 200
   8152258705

   CY - OX UHP200 - CYL OXYGEN UHP SIZE 200
   8152258705

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LICENSED ARCHITECT
RICHARD D. CHONG
NO. C 31174
REN. 08/30/27
STATE OF CALIFORNIA

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

EXTERIOR ELEVATIONS

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

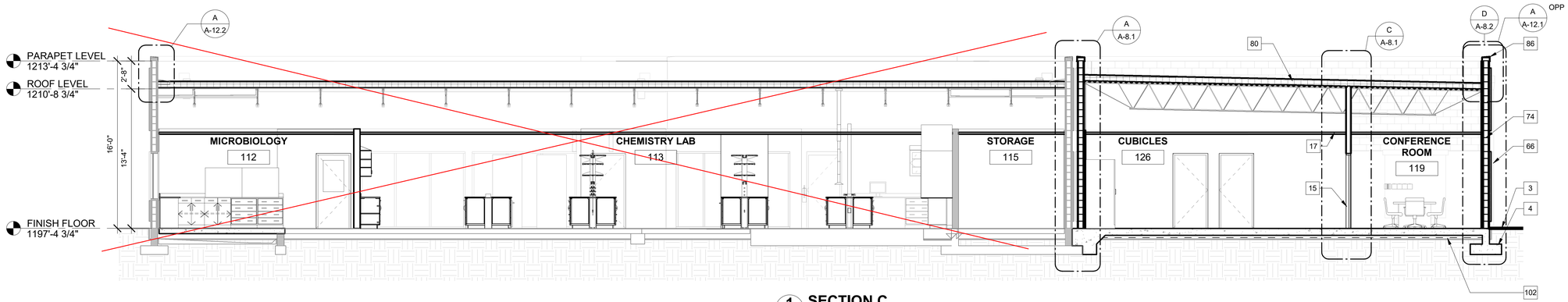
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 36 of 126 Sheets
Scale Horiz AS.SHOWN.
Vert. AS.SHOWN..

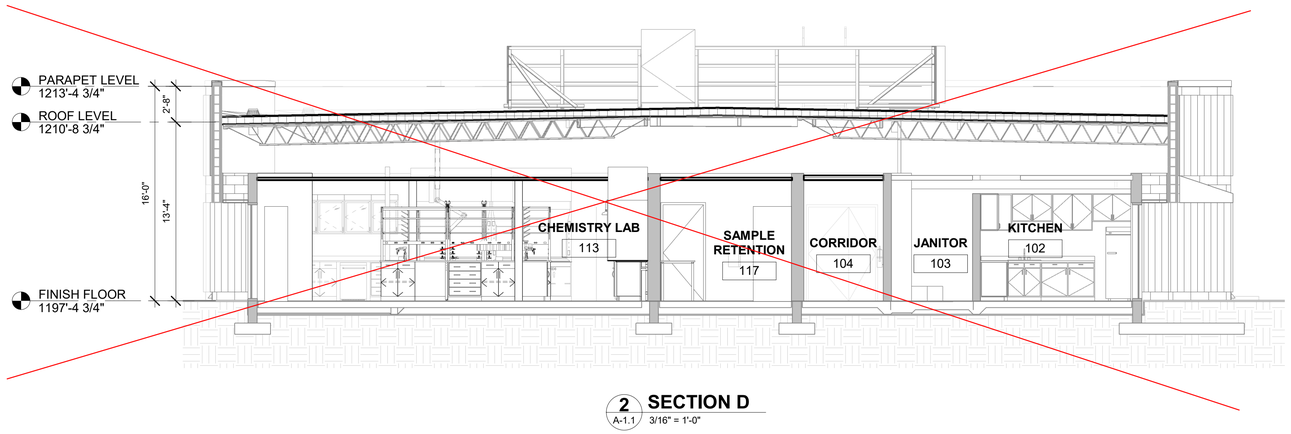
A-3.1

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KEYNOTE LEGEND	
KEY VALUE	KEYNOTE TEXT
3	FINISH GRADE, SEE "C" SHEETS
4	CONCRETE FOUNDATION, SEE "S" SHEETS
15	HOLLOW METAL DOOR AND FRAME, SEE SCHD
17	2'X4' ACT SYSTEM
66	ALUMINUM DOWNSPOUT, TYP
74	8" CMU WALL
80	PVC ROOFING MEMBRANE OVER RIGID INSULATION
86	ALUMINUM COPING, TYP
102	VAPOR RETARDER, 15-MIL THICK MIN CENTERED IN 4 INCH OF SAND, SEE "S" SHEETS



1 A-1.1 **SECTION C**
3/16" = 1'-0"



2 A-1.1 **SECTION D**
3/16" = 1'-0"

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Tel. (213) 457-2200

LICENSED ARCHITECT
RICHARD D. CHONG
NO. C 8171
REN. 08/30/27
STATE OF CALIFORNIA

BENCHMARK

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ELEVATION = 1197.40'

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Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

BUILDING SECTIONS

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

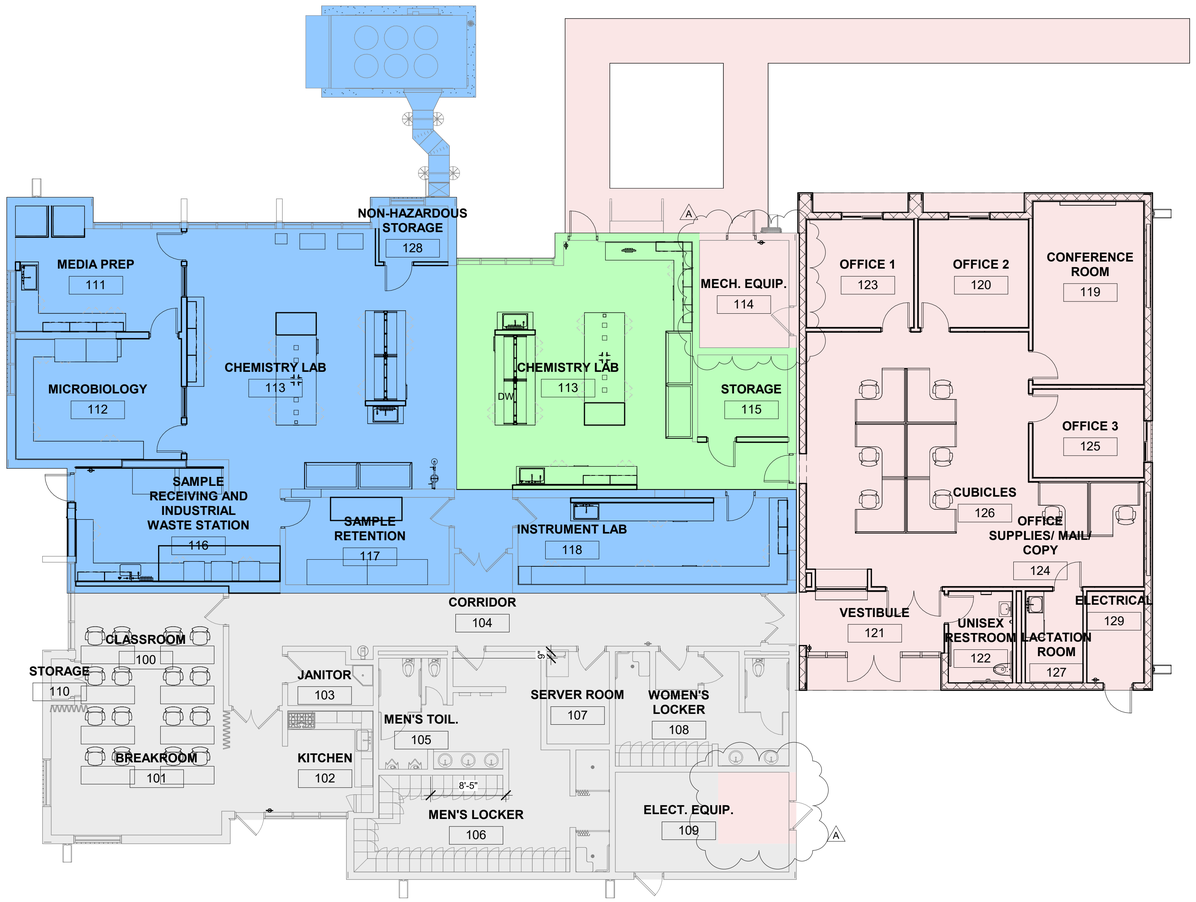
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 37 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-4.1

WW-00007



CONSTRUCTION SEQUENCE PLAN

1/8" = 1'-0"

CONSTRUCTION SEQUENCE

PHASE 1

BUILD THE OFFICE EXPANSION AND RELOCATION OF UTILITIES AS INDICATED ON CIVIL DRAWINGS. ADMINISTRATIVE STAFF TO BE RELOCATED INTO THE OFFICE WING BY OWNER. THIS INCLUDES FLEX SPACE FOR LABORATORY TECHNICIANS.

PHASE 2A NOT IN SCOPE

~~CONTRACT FOR CONSTRUCTION OF THE MICROBIOLOGY AND MEDIA PREPARATION LABORATORIES AND INSTRUMENTATION ROOM. THE CONTRACTOR WILL HAVE FULL ACCESS TO THE WEST SIDE OF THE LABORATORY, INCLUDING ENTRY FROM THE EXISTING LOBBY, TO PERFORM RENOVATIONS, WHILE THE EXISTING EAST LABORATORY AREA REMAINS OPERATIONAL WITH ACCESS MAINTAINED FROM THE SOUTH CORRIDOR AND NEW OFFICE EXPANSION.~~

EXISTING NOT IN SCOPE

~~MINOR PATCH AND REPAIR DURING PHASE 2A~~

PHASE 2B NOT IN SCOPE

~~MOVE ALL LABORATORY OPERATIONS INTO THE NEWLY RENOVATED WEST LABORATORY AREA AND RENOVATE THE EAST LABORATORY AREA.~~

Sequence of Construction

Number	Description
1	SITE DEMOLITION
2	RELOCATE UTILITIES
~~3~~	~~COORDINATE WITH THE OWNER TO PROVIDE A TEMPORARY MCC AND POWER TO ALL EXISTING LOADS ON MCC-OB FROM THE TEMPORARY MCC IN PHASE 2~~
4	ROUTE THE NEW ELECTRICAL DUCTBANK
5	SEAL EXISTING MECHANICAL ROOM DOOR AND CONSTRUCT NEW DOOR
6	RELOCATE LAB GAS SUPPLY TANKS AND PIPING TO NORTH SIDE OF MECHANICAL ROOM
7	INSTALL NEW CB IN EXISTING MCC-OB TO FEED NEW PANELBOARD LP-D. PROVIDE TEMPORARY FEEDER FROM MCC-OB TO PANELBOARD LP-D AND STEP DOWN TRANSFORMER XFMR-D
8	INSTALL NEW PANELBOARD LP-OL AND STEP DOWN TRANSFORMER XFMR-OL INSIDE EXISTING ELECTRICAL ROOM
9	REROOF AND REINSULATE EXISTING BUILDING
10	CONSTRUCT PHASE 1 - NEW ADDITION INCLUDING SIDEWALK IMPROVEMENTS
11	A NEW 4-INCH SANITARY DRAINAGE PIPING WILL BE CONNECTED TO THE SITE SANITARY DRAINAGE SYSTEM TO SERVE THE NEW BUILDING ADDITION AND NEW ~~UNISEX RESTROOM~~
12	RELOCATE OPERATIONS/ADMINISTRATION TO NEW ADDITION BY OWNER.
~~13~~	~~DEMO PHASE 2A, INCLUDING SUSPENDED CEILING~~
~~14~~	~~REPLACE ROOFTOP HVAC UNITS ON EXISTING BUILDING, INCLUDING PERSONNEL AREA~~
~~15~~	~~PROVIDE TEMPORARY MCC TO POWER THE LOADS ON EXISTING MCC-OB DURING REPLACEMENT OF MCC-OB WITH SWBD-OB~~
~~16~~	~~CONSTRUCT PHASE 2A~~
~~17~~	~~REPLACE THE EXISTING MCC-OB WITH THE NEW SWBD-OB IN PHASE 2A~~
~~18~~	~~POWER THE NEW PANELBOARD LP-D, PACU-1, FIRE ALARM CONTROL PANEL FACP, PANELBOARD LP-OL, EXISTING PANELBOARD TX-C, AND EXISTING PANELBOARD LP--OB IN PHASE 2A FROM THE NEW SWBD-OB IN PHASE 2A~~
~~19~~	~~UPGRADE IN FLOOR PLUMBING, PATCH AND REPAIR. CONNECT TO SANITARY SEWER~~
~~20~~	~~MEDIA PREPARATION LABORATORY: THE NEW PLUMBING SYSTEM INCLUDES DOMESTIC COLD WATER, HOT WATER, DI WATER, SANITARY DRAINS, AND VENTS~~
~~21~~	~~SAMPLE RECEIVING/DISPENSING: THE NEW PLUMBING SYSTEM INCLUDES DOMESTIC COLD WATER, HOT WATER, DI WATER, SANITARY DRAINS, VENTS, A NEW DISHWASHER, AND A NEW EMERGENCY EYEWASH~~
~~22~~	~~CHEMISTRY LABORATORY: THE NEW PLUMBING SYSTEM INCLUDES DOMESTIC COLD WATER, HOT WATER, DI WATER, SANITARY DRAIN, VENTS, A NEW DISHWASHER, A NEW EMERGENCY EYEWASH, AND A VACUUM SYSTEM~~
~~23~~	~~PLUMBING FOR THE NEW EQUIPMENT AND SINKS WILL BE CONNECTED TO THE EXISTING BUILDING SANITARY DRAINAGE SYSTEM~~
~~24~~	~~INSTRUMENTATION LABORATORY: THE NEW PLUMBING SYSTEM INCLUDES DOMESTIC COLD WATER, HOT WATER, DI WATER, SANITARY DRAINS, VENTS, A NEW EMERGENCY EYEWASH, AND COMPRESSED AIR/OXYGEN/HELIUM/ARGON SERVICE PIPING~~
~~25~~	~~PATCH AND REPAIR EXISTING CONCRETE SLAB THAT WAS SAWCUT FOR NEW SANITARY DRAIN PIPING~~
~~26~~	~~RELOCATE EXISTING GAS CHROMATOGRAPHY MASS SPECTROMETER GCMS LAB EQUIPMENT TO NEW INSTRUMENT LAB~~
~~27~~	~~POWER EF-3 AND PACU-2 FROM THE NEW SWBD-OB IN PHASE 2B~~
~~28~~	~~DEMO PHASE 2B~~
~~29~~	~~CONSTRUCT PHASE 2B~~
~~30~~	~~PHASE 3, POWER THE NEW CHEMISTRY LAB LOADS FOR PHASE 2B FROM NEW PANELBOARD LP-OL~~
~~31~~	~~REMOVE THE TEMPORARY MCC, AFTER ALL LOADS ARE CONNECTED TO NEW SWBD-OB AND PANELBOARDS~~
~~32~~	~~CHEMISTRY LABORATORY: PLUMBING WORK FOR THE CHEMISTRY LABORATORY WILL BE COMPLETED IN PHASE 2~~
~~33~~	~~PLUMBING FOR THE NEW EQUIPMENT AND SINKS WILL BE CONNECTED TO THE EXISTING BUILDING SANITARY DRAINAGE SYSTEM~~

GENERAL NOTES:

1. THIS IS ONLY FOR GENERAL INFORMATION, SEE THE CORRESPONDING DISCIPLINE FOR EXACT DETAILS PER EACH PHASE.

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Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED PROFESSIONAL ENGINEER — RICHARD D. CHONG — NO. C 81774 — REN. 06/30/27 — STATE OF CALIFORNIA

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

CONSTRUCTION PHASING FLOOR & SITE PLAN

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 38 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-5.1

WW-00007

EXISTING

NEW CONSTRUCTION



N

REFLECTED CEILING PLAN

3/16" = 1'-0"

KEYNOTE LEGEND	
KEY VALUE	KEYNOTE TEXT
17	2'X4' ACT SYSTEM
~~18~~	~~EXHAUST DROPS, TYP~~
19	2'X4' LIGHT FIXTURE, SEE "E" SHEETS
~~20~~	~~SNORKEL, TYP~~
21	2'X2' SUPPLY DIFFUSER, SEE "H" SHEETS
22	2'X2' RETURN DIFFUSER, SEE "H" SHEETS
~~87~~	~~GYP BOARD CEILING, SEE HVAC DRAWING M-4. EXTENT OF WORK TO BE FIELD VERIFIED AND COORDINATED WITH THE APPROVED EQUIPMENT~~
~~96~~	~~FUME HOOD, TRIM RING NEEDED AT FUME HOOD EXHAUST~~
~~103~~	~~POWER POLE~~
~~104~~	~~OVEN CANOPY~~

REF. CLG. PLAN LEGEND

- SUSPENDED CEILING SYSTEM
- GYP BOARD
- LIGHTING FIXTURE
- LIGHTING FIXTURE
- LIGHTING FIXTURE
- SUPPLY DIFFUSER
- RETURN DIFFUSER
- SNORKEL OPENING
- NO SCOPE
- NOT IN SCOPE

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REGISTERED ARCHITECT
RICHARD D. CHONG
NO. C 8171
REN. 08/30/27
STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

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Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

REFLECTED CEILING PLAN

Design by: TIM KING
Date: MAY 2025
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Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

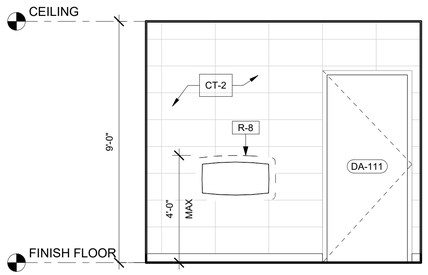
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

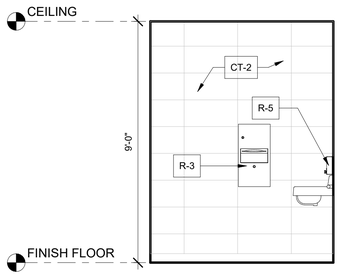
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Scale Horiz. AS.SHOWN..
Vert. AS.SHOWN..

A-6.1

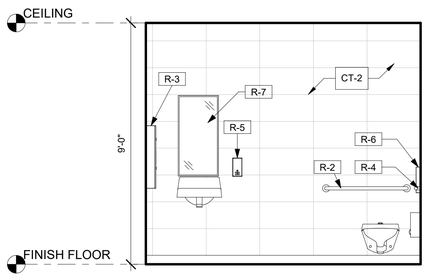
WW-00007



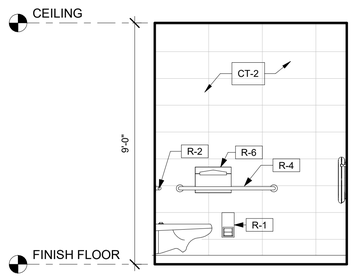
1 WEST INTERIOR ELEVATION - RESTROOM
A-1.1 3/8" = 1'-0"



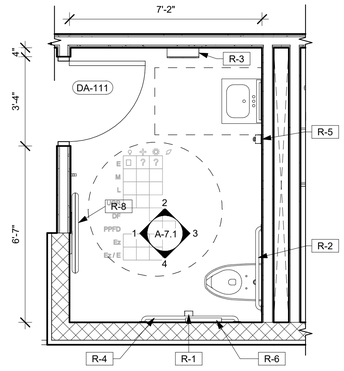
2 NORTH INTERIOR ELEVATION - RESTROOM
A-1.1 3/8" = 1'-0"



3 EAST INTERIOR ELEVATION - RESTROOM
A-1.1 3/8" = 1'-0"



4 SOUTH INTERIOR ELEVATION - RESTROOM
A-1.1 3/8" = 1'-0"



N

5 UNISEX RESTROOM ENLARGED PLAN
A-1.17 3/8" = 1'-0"

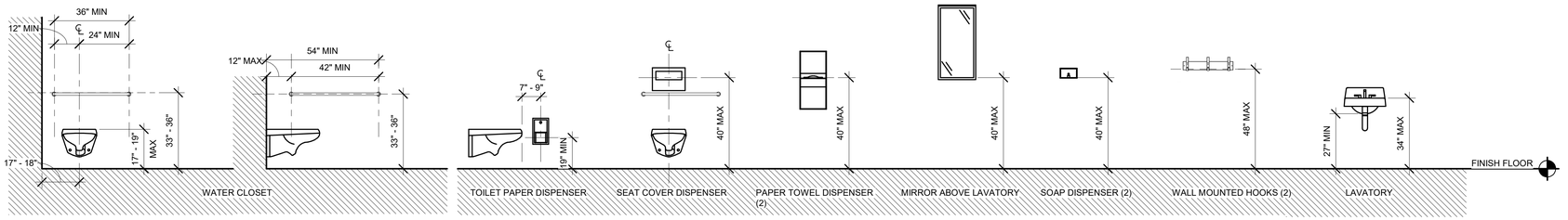
GENERAL NOTES:

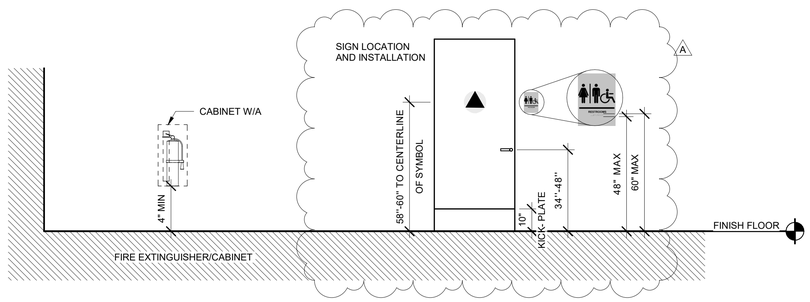
1. FURNITURE IS NOT SHOWN FOR CLARITY.
2. SEE SHEET A-12.6 FOR SIGNAGE DETAILS.

TOILET ACCESSORIES SCHEDULE

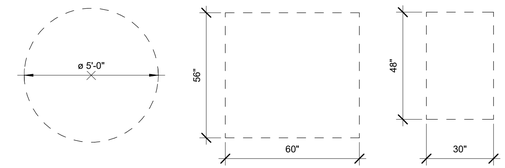
MARK	DESCRIPTION
R-1	TOILET TISSUE HOLDER
R-2	HORIZONTAL GRAB BAR 36"
R-3	SURFACE MOUNTED TOWEL DISPENSER/ WASTE DISPENSER
R-4	HORIZONTAL GRAB BAR 42"
R-5	SURFACE MOUNTED SOAP DISPENSER
R-6	SEAT COVER DISPENSER
R-7	GLASS MIRROR
R-8	BABY CHANGING STATION

GENERAL NOTES:
1. PROVIDE WOOD BLOCKING AS REQUIRED FOR ALL TOILET ACCESSORIES.
2. WALL MOUNTED ACCESSORIES SHALL BE MOUNTED IN ACCORDANCE WITH REACH LIMITS APPLICABLE TO INSTALLATION LOCATION:
   - MAXIMUM UNOBSTRUCTED FORWARD OR SIDE REACH IS 48".
   - MAXIMUM OBSTRUCTED FORWARD REACH IS 44".
   - MAXIMUM OBSTRUCTED SIDE REACH IS 46".





CLEAR FLOOR AREA REQUIREMENTS



60" TURNING RADIUS

CLEAR FLOOR AREA AT WATER CLOSET IN HANDICAPPED STALL

CLEAR FLOOR AREA AT WATER FOUNTAINS, NON-HANDICAPPED STALLS, SHOWERS AND LAVATORIES

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BENCHMARK

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Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

INTERIOR ELEVATIONS 1

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
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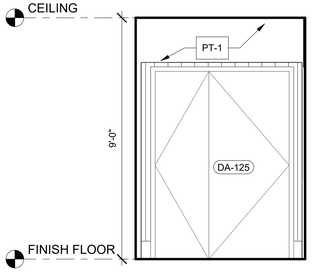
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

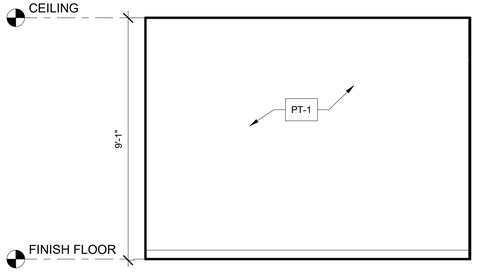
Sheet 40 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-7.1

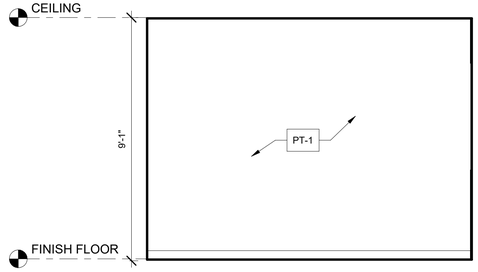
WW-00007



1 A-1.1 **WEST INTERIOR ELEVATION - VESTIBULE**
3/8" = 1'-0"



5 A-1.1 **WEST INTERIOR ELEVATION - OFFICE 1**
3/8" = 1'-0"

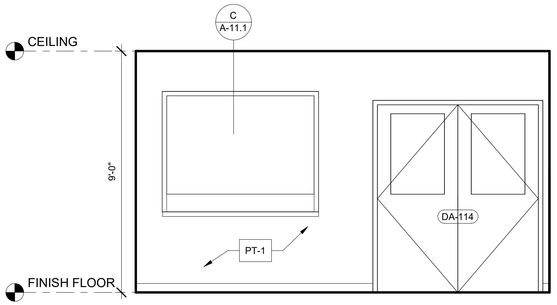


9 A-1.1 **WEST INTERIOR ELEVATION - OFFICE 2**
3/8" = 1'-0"

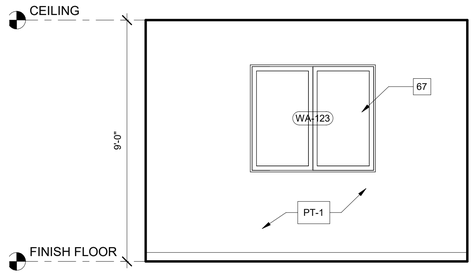
GENERAL NOTES:

1. FURNITURE IS NOT SHOWN FOR CLARITY.
2. REFER TO SHEETS A-1.3 TO A-1.5 FOR EQUIPMENT LIST.

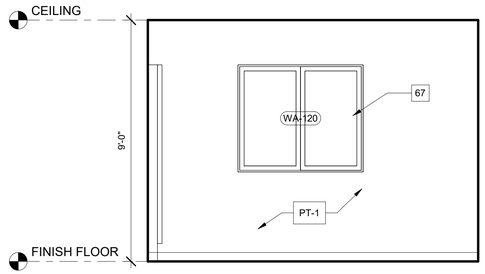
KEYNOTE LEGEND	
KEY VALUE	KEYNOTE TEXT
67	ALUMINUM SLIDING WINDOW, SEE SCHD



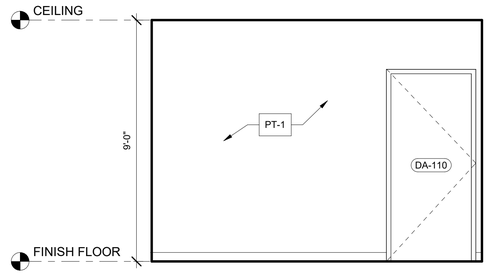
2 A-1.1 **NORTH INTERIOR ELEVATION - VESTIBULE**
3/8" = 1'-0"



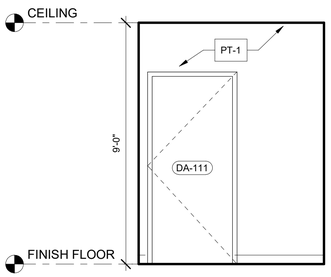
6 A-1.1 **NORTH INTERIOR ELEVATION - OFFICE 1**
3/8" = 1'-0"



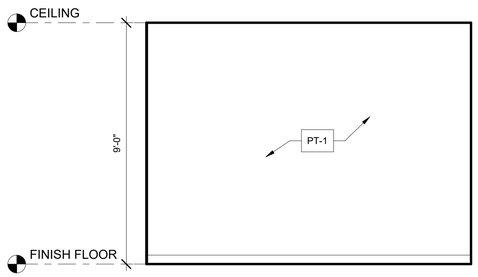
10 A-1.1 **NORTH INTERIOR ELEVATION - OFFICE 2**
3/8" = 1'-0"



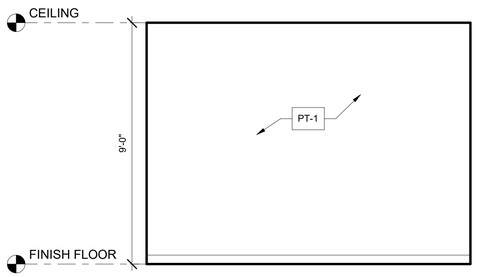
12 A-1.1 **SOUTH INTERIOR ELEVATION - OFFICE 2**
3/8" = 1'-0"



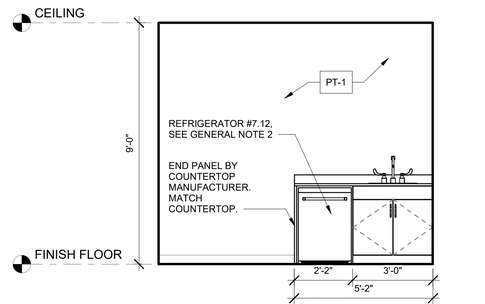
3 A-1.1 **EAST INTERIOR ELEVATION - VESTIBULE**
3/8" = 1'-0"



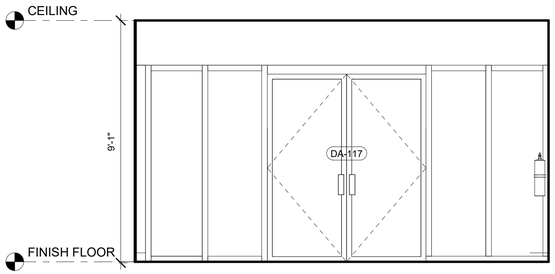
7 A-1.1 **EAST INTERIOR ELEVATION - OFFICE 1**
3/8" = 1'-0"



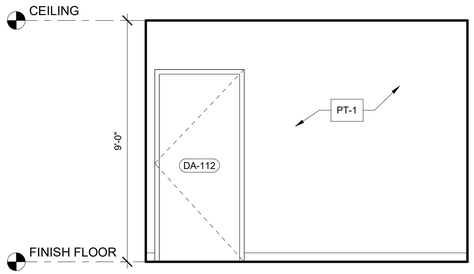
11 A-1.1 **EAST INTERIOR ELEVATION - OFFICE 2**
3/8" = 1'-0"



13 A-1.1 **WEST INTERIOR ELEVATION - LACTATION ROOM**
3/8" = 1'-0"



4 A-1.1 **SOUTH INTERIOR ELEVATION - VESTIBULE**
3/8" = 1'-0"



8 A-1.1 **SOUTH INTERIOR ELEVATION - OFFICE 1**
3/8" = 1'-0"

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Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER
RICHARD D. CHONG
NO. C 81711
REN. 08/31/27
STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

INTERIOR ELEVATIONS 2

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

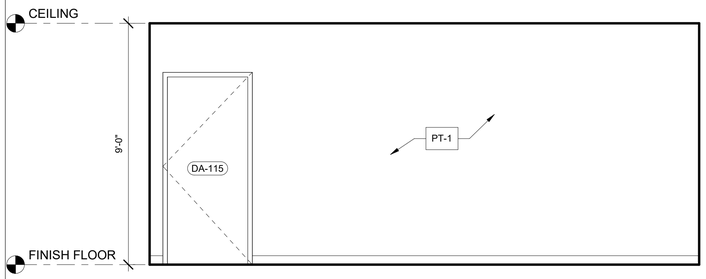
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

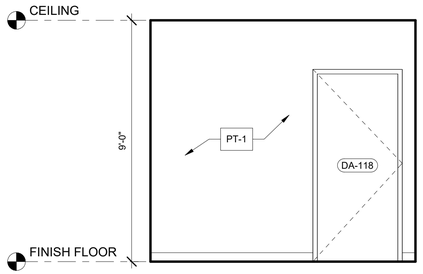
Sheet 41 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-7.2

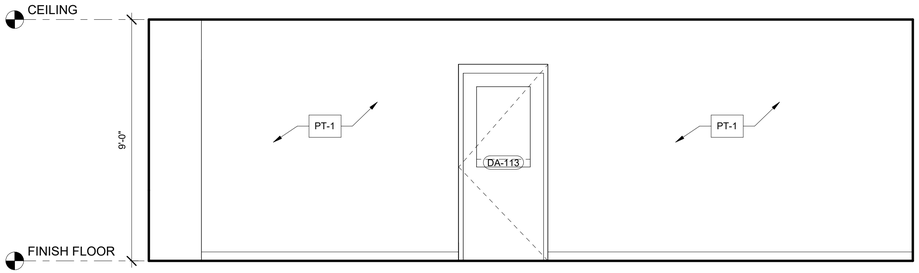
WW-00007



1 A-1.1 **WEST INTERIOR ELEVATION - CONFERENCE ROOM**
3/8" = 1'-0"



5 A-1.1 **WEST INTERIOR ELEVATION - OFFICE 3**
3/8" = 1'-0"

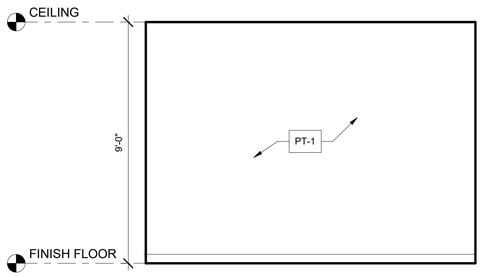


9 A-1.1 **WEST INTERIOR ELEVATION - CUBICLES**
3/8" = 1'-0"

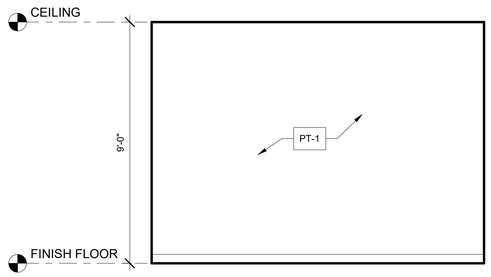
GENERAL NOTES:

1. FURNITURE IS NOT SHOWN FOR CLARITY.

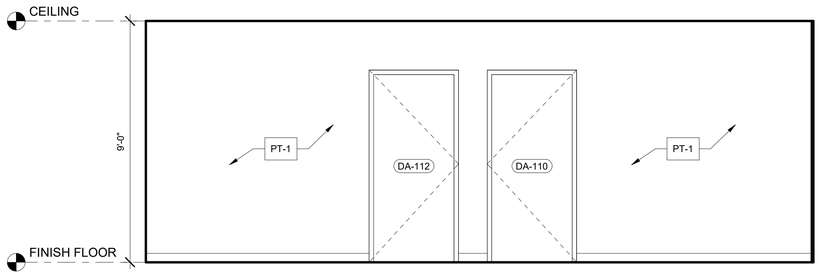
KEYNOTE LEGEND	
KEY VALUE	KEYNOTE TEXT
67	ALUMINUM SLIDING WINDOW, SEE SCHD
88	ALUMINUM WINDOW, SEE SCHD



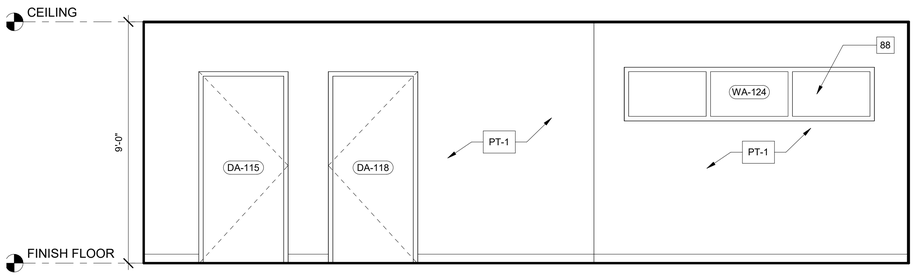
2 A-1.1 **NORTH INTERIOR ELEVATION - CONFERENCE ROOM**
3/8" = 1'-0"



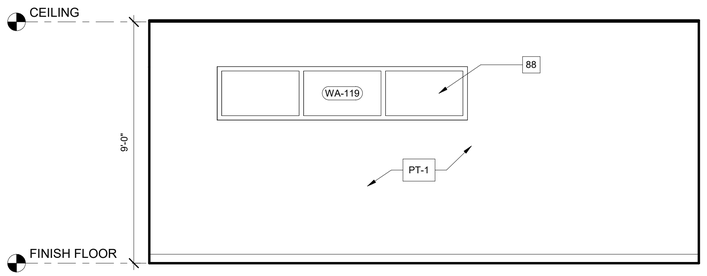
6 A-1.1 **NORTH INTERIOR ELEVATION - OFFICE 3**
3/8" = 1'-0"



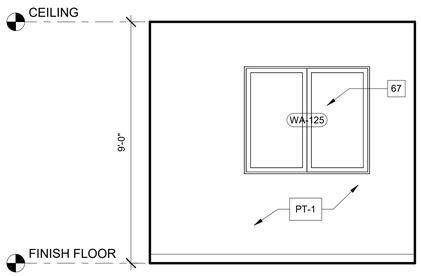
10 A-1.1 **NORTH INTERIOR ELEVATION - CUBICLES**
3/8" = 1'-0"



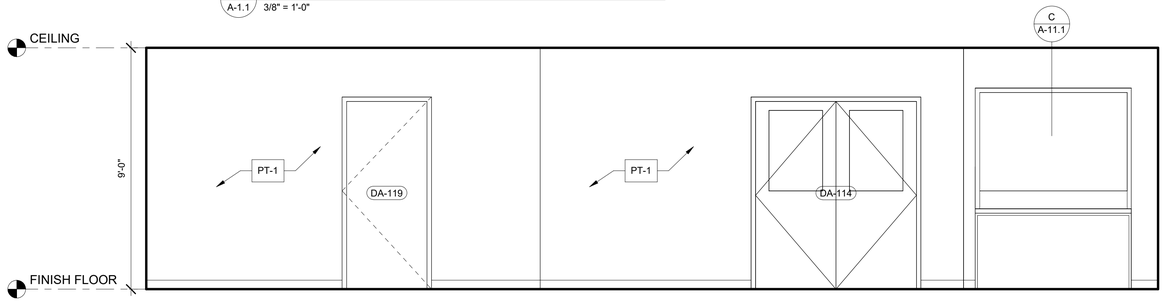
11 A-1.1 **EAST INTERIOR ELEVATION - CUBICLES**
3/8" = 1'-0"



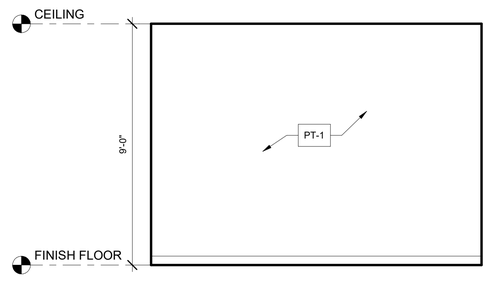
3 A-1.1 **EAST INTERIOR ELEVATION - CONFERENCE ROOM**
3/8" = 1'-0"



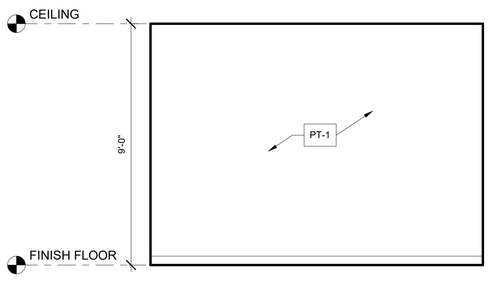
7 A-1.1 **EAST INTERIOR ELEVATION - OFFICE 3**
3/8" = 1'-0"



12 A-1.1 **SOUTH INTERIOR ELEVATION - CUBICLES**
3/8" = 1'-0"



4 A-1.1 **SOUTH INTERIOR ELEVATION - CONFERENCE ROOM**
3/8" = 1'-0"



8 A-1.1 **SOUTH INTERIOR ELEVATION - OFFICE 3**
3/8" = 1'-0"

CDM Smith
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Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED CIVIL ENGINEER
RICHARD D. CHONG
NO. C 81174
REN. 06/30/27
STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

INTERIOR ELEVATIONS 3

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

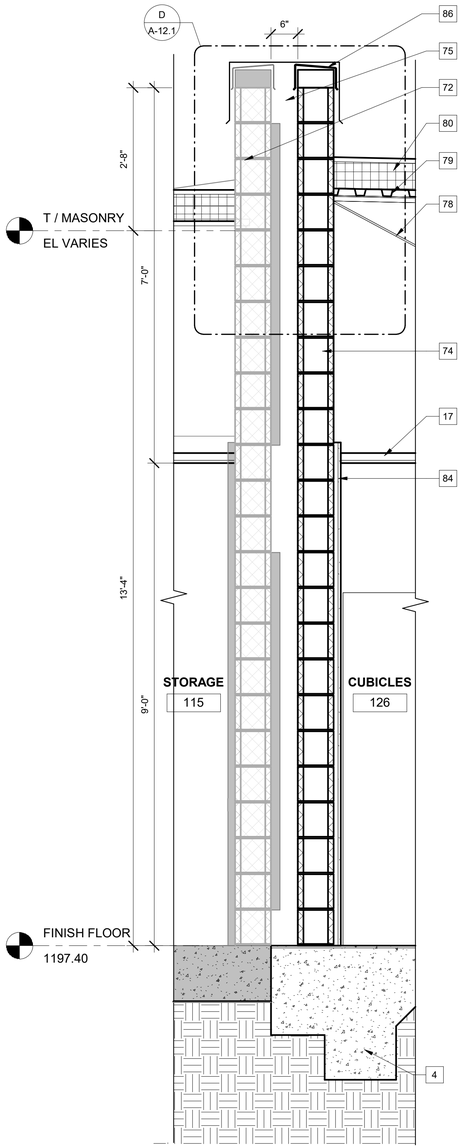
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 42 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

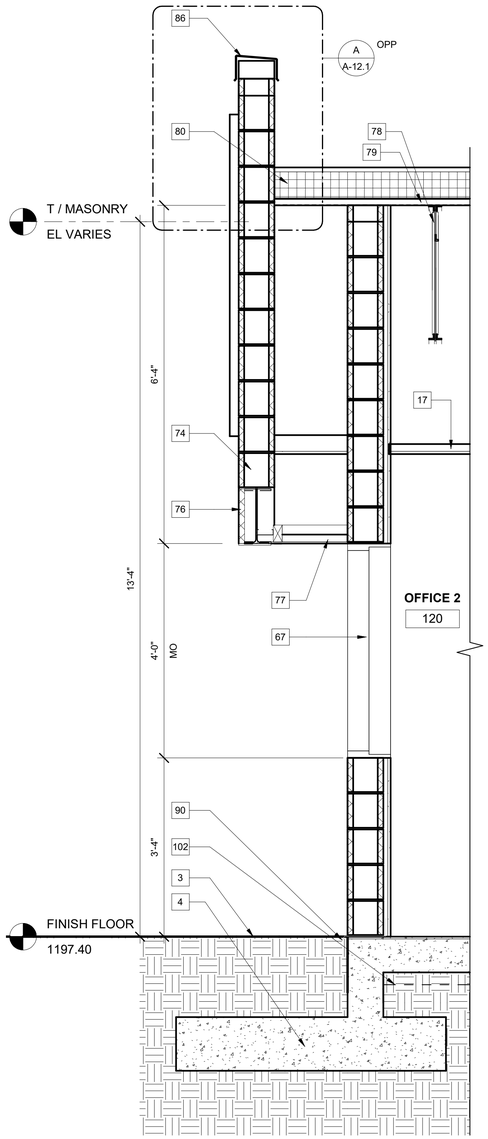
A-7.3

WW-00007

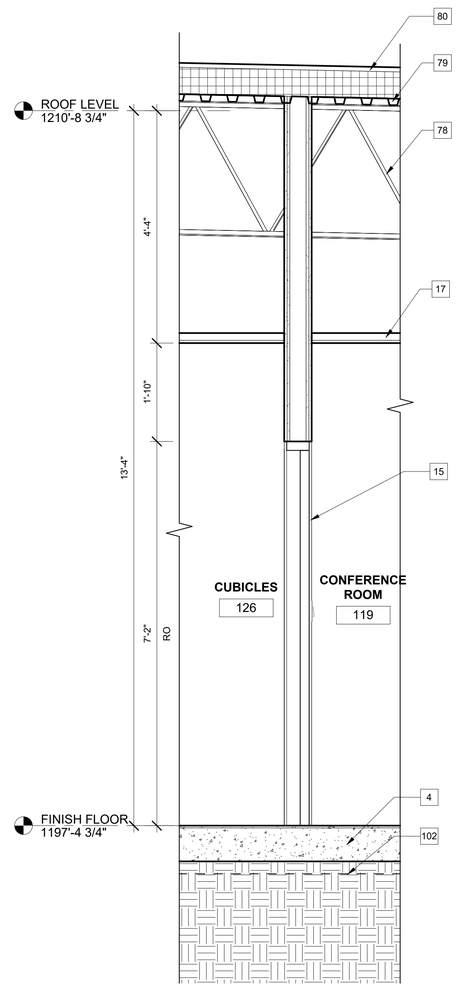
KEYNOTE LEGEND	
KEY VALUE	KEYNOTE TEXT
3	FINISH GRADE, SEE "C" SHEETS
4	CONCRETE FOUNDATION, SEE "S" SHEETS
15	HOLLOW METAL DOOR AND FRAME, SEE SCHD
17	2'X4' ACT SYSTEM
67	ALUMINUM SLIDING WINDOW, SEE SCHD
72	EXISTING CMU
74	8" CMU WALL
75	EXPANSION JOINT, SEE ROOF DETAILS
76	VENEER
77	1/2" THICK STRUCTURE, PLYWOOD, CUT TO FIT. EXPOSED WOOD AND STEEL SHALL BE LATH AND PLASTER
78	ROOF JOIST, SEE "S" SHEETS
79	1 1/2" METAL ROOF DECK, SEE "S" SHEETS
80	PVC ROOFING MEMBRANE OVER RIGID INSULATION
84	PAINTED GYP BOARD OVER CONTINUOUS INSULATION SUPPORT SYSTEM
86	ALUMINUM COPING, TYP
90	GALVANIZED METAL FLASHING
102	VAPOR RETARDER



A EXPANSION JOINT SECTION
A-4.1 3/4" = 1'-0"



B WALL SECTION 1
A-1.17 3/4" = 1'-0"



C WALL SECTION 2
A-4.1 3/4" = 1'-0"

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT
RICHARD D. CHONG
No. 6174
REN. 06/30/27
STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

WALL SECTIONS 1

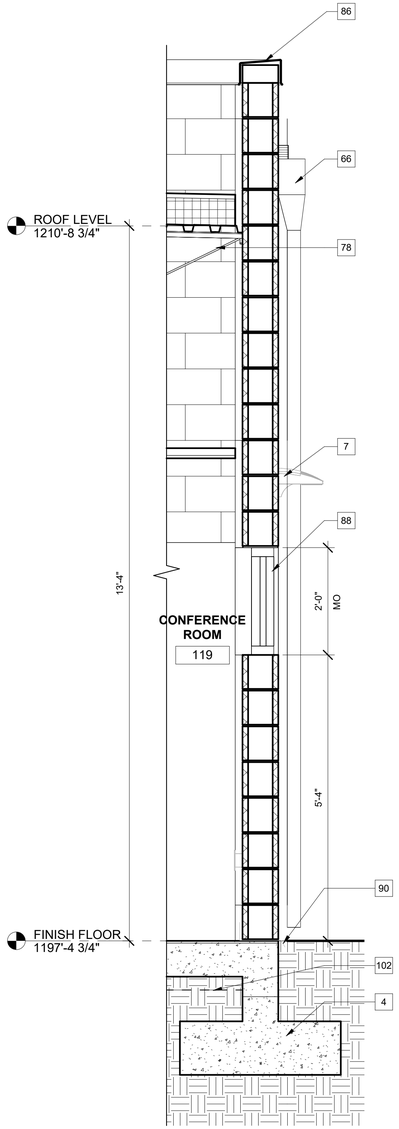
Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

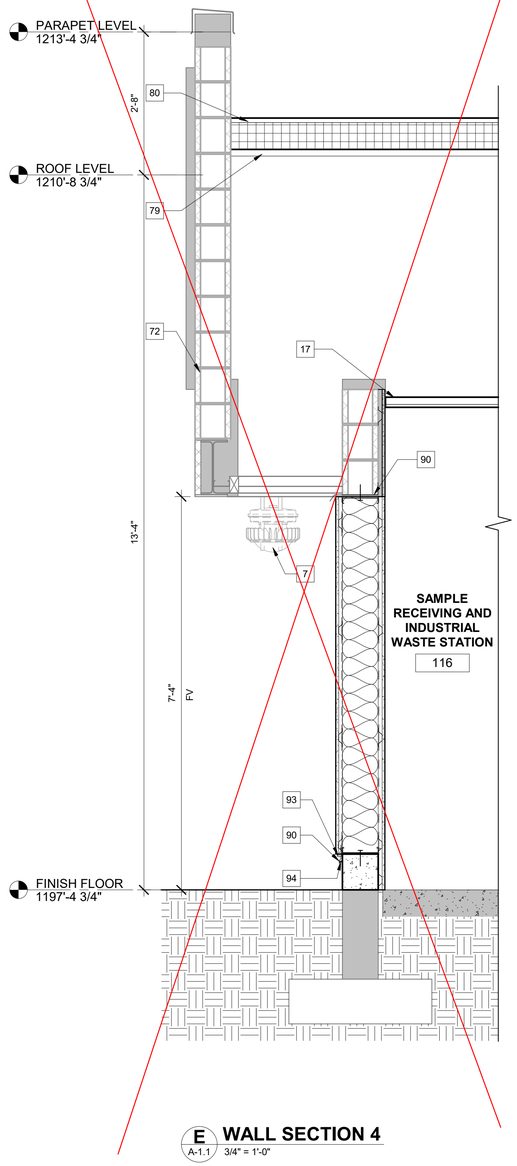
Sheet 43 of 126 Sheets
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Vert. AS SHOWN

A-8.1

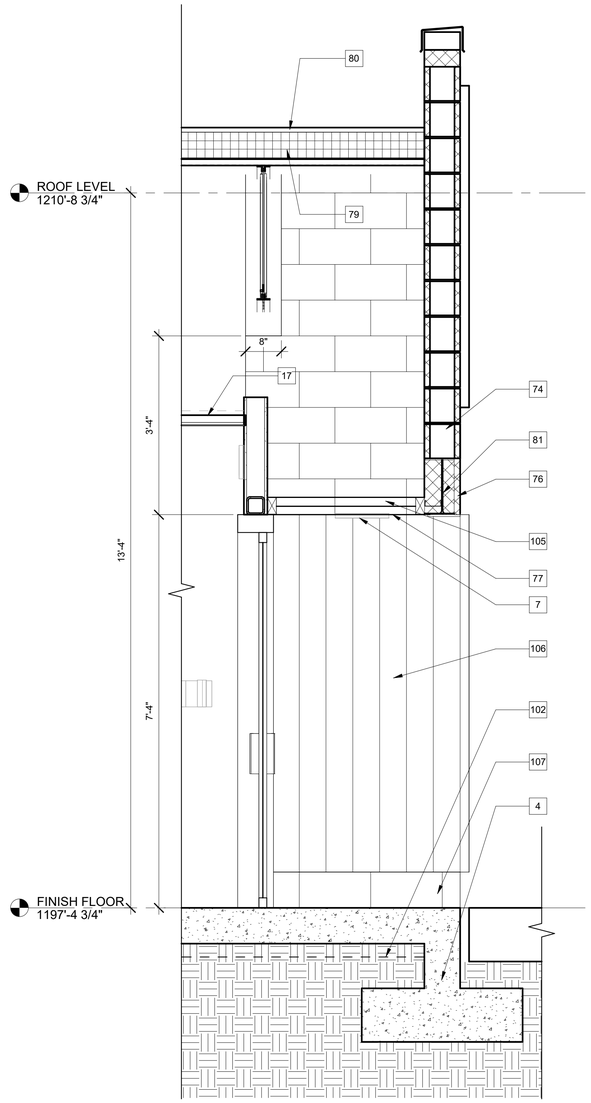
WW-00007



D A-4.1 **WALL SECTION 3**
3/4" = 1'-0"



E A-1.1 **WALL SECTION 4**
3/4" = 1'-0"



F A-1.17 **WALL SECTION 5**
3/4" = 1'-0"

KEYNOTE LEGEND	
KEY VALUE	KEYNOTE TEXT
4	CONCRETE FOUNDATION, SEE "S" SHEETS
7	LIGHT FIXTURE, SEE "E" SHEETS
17	2'X4' ACT SYSTEM
66	ALUMINUM DOWNSPOUT, TYP
72	EXISTING CMU
74	8" CMU WALL
76	VENEER
77	1/2" THICK STRUCTURE, PLYWOOD, CUT TO FIT. EXPOSED WOOD AND STEEL SHALL BE LATH AND PLASTER
78	ROOF JOIST, SEE "S" SHEETS
79	1 1/2" METAL ROOF DECK, SEE "S" SHEETS
80	PVC ROOFING MEMBRANE OVER RIGID INSULATION
81	STRUCTURAL FRAMING, SEE "S" SHEETS
86	ALUMINUM COPING, TYP
88	ALUMINUM WINDOW, SEE SCHD
90	GALVANIZED METAL FLASHING
93	METAL PANEL SIDING WALL BOTTOM CLIP
94	CAULKING
102	VAPOR RETARDER
105	PLYWOOD
106	FLUTED BLOCK FINISH TO MATCH EXISTING
107	SPLIT FACE BLOCK FINISH TO MATCH EXISTING

CDM Smith
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Los Angeles, CA 90017
Tel: (213) 457-2200

RICHARD D. CHONG
No. 8174
REN. 06/30/27
STATE OF CALIFORNIA
REGISTERED ARCHITECT

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

WALL SECTIONS 2

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY:
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 — 6/11/2025 DATE

APPROVED BY:
Goutam K. Dobey, City Engineer, RCE 75646 — 6/11/2025 DATE

Sheet 44 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-8.2

WW-00007

DOOR SCHEDULE

DOOR NUMBER	ROOM NAME	EXT DOOR		SIZE WIDTH	SIZE HEIGHT	DOOR TYPE	DOOR MATERIAL	DOOR GLAZING	FRAME TYPE	FRAME MATERIAL	DETAILS HEAD	DETAILS JAMB	DETAILS THRESHOLD	HARDWARE SET	NOTES
~~DA-100~~	~~MEDIA PREP~~			~~3'-0"~~	~~7'-0"~~	~~HG~~	~~WD~~	~~LOW-E~~	~~F1~~	~~SPEC~~	~~G/A-9.2~~	~~H/A-9.2~~	~~I/A-9.2~~	~~6~~	
~~DA-101~~	~~CHEMISTRY LAB~~			~~3'-0"~~	~~7'-0"~~	~~HG~~	~~WD~~	~~LOW-E~~	~~F1~~	~~SPEC~~	~~G/A-9.2~~	~~H/A-9.2~~	~~I/A-9.2~~	~~6~~	
~~DA-102~~	~~MECH. EQUIP.~~	~~*~~		~~3'-0"~~	~~7'-0"~~	~~F~~	~~HM~~	~~--~~	~~F2~~	~~HM~~	~~A/A-9.2~~	~~B/A-9.2~~	~~C/A-9.2~~	~~1~~	
~~DA-103~~	~~CHEMISTRY LAB~~	~~*~~		~~3'-0"~~	~~7'-0"~~	~~F~~	~~HM~~	~~--~~	~~F2~~	~~HM~~	~~A/A-9.2~~	~~B/A-9.2~~	~~C/A-9.2~~	~~8~~	
~~DA-104~~	~~MEDIA PREP~~			~~3'-0"~~	~~7'-0"~~	~~HG~~	~~WD~~	~~LOW-E~~	~~F1~~	~~SPEC~~	~~G/A-9.2~~	~~H/A-9.2~~	~~I/A-9.2~~	~~10~~	
~~DA-105~~	~~NON-HAZARDOUS STORAGE~~			~~3'-0"~~	~~7'-0"~~	~~F~~	~~WD~~	~~--~~	~~F1~~	~~SPEC~~	~~G/A-9.2~~	~~H/A-9.2~~	~~I/A-9.2~~	~~5~~	
~~DA-106~~	~~INSTRUMENT LAB~~			~~3'-0"~~	~~7'-0"~~	~~HG~~		~~LOW-E~~	~~F2~~		~~G/A-9.2~~	~~H/A-9.2~~	~~I/A-9.2~~	~~6~~	
~~DA-107~~	~~STORAGE~~			~~3'-0"~~	~~7'-0"~~	~~F~~	~~WD~~	~~--~~	~~F1~~	~~SPEC~~	~~G/A-9.2~~	~~H/A-9.2~~	~~I/A-9.2~~	~~5~~	
~~DA-108~~	~~SAMPLE RETENTION~~			~~3'-0"~~	~~7'-0"~~	~~HG~~	~~WD~~	~~LOW-E~~	~~F1~~	~~SPEC~~	~~G/A-9.2~~	~~H/A-9.2~~	~~I/A-9.2~~	~~6~~	
~~DA-109~~	~~SAMPLE RECEIVING AND INDUSTRIAL WASTE STATION~~	~~*~~		~~3'-0"~~	~~7'-0"~~	~~HG~~	~~HM~~	~~LOW-E~~	~~F2~~	~~HM~~	~~A/A-9.2~~	~~B/A-9.2~~	~~C/A-9.2~~	~~8~~	
DA-110	OFFICE 2			3'-0"	7'-0"	F	WD	--	F1	SPEC	G/A-9.2	H/A-9.2	I/A-9.2	3	
DA-111	UNISEX RESTROOM			3'-0"	7'-0"	F	WD	--	F1	SPEC	G/A-9.2	H/A-9.2	I/A-9.2	4	
DA-112	OFFICE 1			3'-0"	7'-0"	F	WD	--	F1	SPEC	G/A-9.2	H/A-9.2	I/A-9.2	3	
DA-113	CUBICLES			3'-0"	7'-0"	HG	HM	LOW-E	F2	HM	F/A-13.1	G/A-13.1	H/13.1	7	
DA-114	CUBICLES		PR	3'-0"	7'-0"	HG	WD	LOW-E	F3	SPEC	G/A-9.2	H/A-9.2	I/A-9.2	9	
DA-115	CONFERENCE ROOM			3'-0"	7'-0"	F	WD	--	F1	SPEC	G/A-9.2	H/A-9.2	I/A-9.2	3	
DA-117	VESTIBULE	*	PR	3'-0"	7'-0"	FG	HM	LOW-E	SF1	HM	P/A-9.2	N/A-9.2	O/A-9.2	2	
DA-118	OFFICE 3			3'-0"	7'-0"	F	WD	--	F1	SPEC	G/A-9.2	H/A-9.2	I/A-9.2	3	
DA-119	LACTATION ROOM			3'-0"	7'-0"	F	WD	--	F1	SPEC	G/A-9.2	H/A-9.2	C/A-9.2	4	DEADBOLT LOCK ON INSIDE
DA-120	ELECTRICAL	*		3'-0"	7'-0"	F	HM	--	F2	HM	A/A-9.2	B/A-9.2	C/A-9.2	1	
~~DA-121~~	~~SAMPLE RETENTION~~			~~3'-0"~~	~~7'-0"~~	~~F~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~6~~	~~CUT EXISTING DOOR AS REQUIRED TO MAINTAIN PROPER CLEARANCE ABOVE FINISHED FLOOR ELEVATION AFTER THE APPLICATION OF 1/2" EPOXY FLOORING. VERIFY FINAL DOOR CLEARANCE ON-SITE AND ENSURE SMOOTH OPERATION.~~
~~DA-122~~	~~INSTRUMENT LAB~~			~~3'-0"~~	~~7'-0"~~	~~F~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~6~~	~~CUT EXISTING DOOR AS REQUIRED TO MAINTAIN PROPER CLEARANCE ABOVE FINISHED FLOOR ELEVATION AFTER THE APPLICATION OF 1/2" EPOXY FLOORING. VERIFY FINAL DOOR CLEARANCE ON-SITE AND ENSURE SMOOTH OPERATION.~~
~~DA-123~~	~~CORRIDOR~~			~~5'-0"~~	~~7'-0"~~	~~F~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~C/A-9.2~~	~~9~~	~~CUT EXISTING DOOR AS REQUIRED TO MAINTAIN PROPER CLEARANCE ABOVE FINISHED FLOOR ELEVATION AFTER THE APPLICATION OF 1/2" EPOXY FLOORING. VERIFY FINAL DOOR CLEARANCE ON-SITE AND ENSURE SMOOTH OPERATION.~~

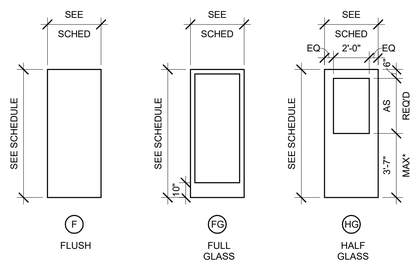
WINDOW SCHEDULE

WINDOW NUMBER	ROOM NAME	SIZE HEIGHT	SIZE WIDTH	TYPE	FRAME MATERIAL	FRAME FINISH	GLAZING	DETAILS HEAD	DETAILS JAMB	DETAILS SILL	NOTES
~~WA-111~~	~~MEDIA PREP~~	~~4'-0"~~	~~3'-6"~~	~~W2~~	~~ALUM~~	~~ALUM~~	~~LOW-E~~	~~J/A-9.2~~	~~K/A-9.2~~	~~L/A-9.2~~	
~~WA-112~~	~~MICROBIOLOGY~~	~~4'-0"~~	~~3'-6"~~	~~W2~~	~~ALUM~~	~~ALUM~~	~~LOW-E~~	~~J/A-9.2~~	~~K/A-9.2~~	~~L/A-9.2~~	
WA-119	CONFERENCE ROOM	2'-0"	9'-4"	W3	ALUM	ALUM	LOW-E	D/A-9.2	E/A-9.2	F/A-9.2	PHASE 1
WA-120	OFFICE 2	4'-0"	4'-8"	W1	ALUM	ALUM	LOW-E	D/A-9.2	E/A-9.2	F/A-9.2	PHASE 1
WA-123	OFFICE 1	4'-0"	4'-8"	W1	ALUM	ALUM	LOW-E	D/A-9.2	E/A-9.2	F/A-9.2	PHASE 1
WA-124	OFFICE SUPPLIES/ MAIL/ COPY	2'-0"	9'-4"	W3	ALUM	ALUM	LOW-E	D/A-9.2	E/A-9.2	F/A-9.2	PHASE 1
WA-125	OFFICE 3	4'-0"	4'-8"	W1	ALUM	ALUM	LOW-E	D/A-9.2	E/A-9.2	F/A-9.2	PHASE 1
WA-126	CUBICLES	4'-6"	5'-10"	W2	ALUM	ALUM	LOW-E	J/A-9.2	K/A-9.2		WINDOW COUNTER PHASE 1

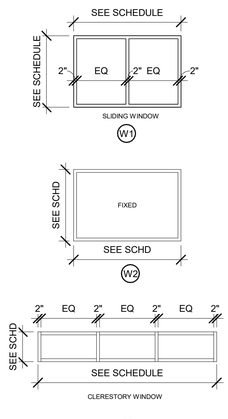
DOOR GENERAL NOTES:

1. ALL HOLLOW METAL DOORS TO BE PRIMED AND PAINTED.
2. DOOR DESIGNATIONS ON SUBMITTAL SHALL COINCIDE WITH DOOR DESIGNATIONS INDICATED ON CONTRACT DOCUMENTS.
3. ANY ITEM OF HARDWARE NORMALLY REQUIRED BY GOOD PRACTICE, OR AS TO MEET STATE OR LOCAL CODES, FURNISH EVEN THOUGH IT MAY NOT BE SPECIFICALLY MENTIONED.
4. REFER TO DOOR TYPE LEGEND FOR DOOR TYPE DESIGNATION DESCRIPTION.
5. REFER TO DOOR FRAME PROFILES FOR FRAME TYPE DESIGNATION DESCRIPTION.
6. LOCATE DOORS 6" FROM NEAREST CORNER TO OUTSIDE EDGE OF FRAME, UNLESS NOTED/ DIMENSIONED OTHERWISE.
7. ALL THRESHOLDS SHALL NOT EXCEED 1/2" HIGH.
8. ALL DOORS MUST MEET CALIFORNIA ACCESSIBILITY REQUIREMENTS.
9. AT DOORS, SEALANT COLOR IS TO MATCH DOOR FINISH. SUBMIT COLOR SAMPLES FOR ARCHITECT'S SELECTION.
10. PROVIDE UL APPROVED DOORS AND FRAMES AT ALL RATED OPENINGS.

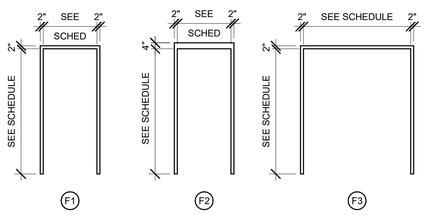
DOOR TYPES



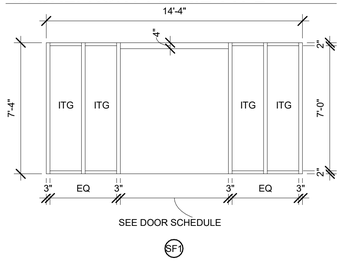
WINDOW TYPES



FRAME TYPES



STOREFRONT FRAME TYPE



GLAZING LEGEND:

LG - LAMINATED GLASS
ITG - INSULATED TEMPERED GLASS

DOOR HARDWARE SET LEGEND:

Set: 1.0 – EXTERIOR SINGLE HM UTILITY / STORAGE
Doors: DA-102, DA-120

Qty	Description	Catalog Number	Finish	Mfr
1	Continuous Hinge	CFM x Height Required x SLI-HD1	—	PE
1	Storeroom Lock	10 8204 LNL	US32D	SA
1	Surface Closer	281 CPS	EN	SA
1	Kick Plate	K1050 10" x 2" LDW BEV CSK	US32D	RO
1	Threshold	2005AT	—	PE
1	Rain Guard	346C + 4" Overall Door Width	—	PE
1	Gasketing	2891AV	—	PE
1	Door Sweep	345CNB	—	PE
1	Position Switch	DPS-M-BK	—	SU

Set: 2.0 – EXTERIOR ALSF PAIR VESTIBULE ENTRY
Doors: DA-117
Note: Exit devices to be dogged during designated hours for push/pull function. Coordinate with storefront submittals for compatibility.

Qty	Description	Catalog Number	Finish	Mfr
2	Continuous Hinge	CFM x Height Required x SLI-HD1	—	PE
1	Mullion	L980A x Cyl to Match Facility Key	US28	SA
1	Rim Exit Device 10 8804 Less Pull (Nightlatch)		US32D	SA
1	Rim Exit Device 8810 EO (Exit Only)		US32D	SA
2	Door Pull	RM3310-36	US32D	RO
2	Surface Closer	281 CPS	EN	SA
1	Threshold	2005AT	—	PE
1	Perimeter Seals	By Aluminum Storefront Manufacturer	—	OT
2	Door Sweep	345CNB	—	PE
1	Position Switch	DPS-M-BK	—	SU

Set: 3.0 – OFFICE FUNCTION WD
Doors: DA-112, DA-110, DA-115, DA-118

Qty	Description	Catalog Number	Finish	Mfr
3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Office/Entry Lock	10 8205 LNL	US32D	SA
1	Surface Closer	1431 O	EN	SA
1	Kick Plate	K1050 10" x 2" LDW BEV CSK	US32D	RO
1	Wall Stop	406	US32D	RO
3	Silencer	608-RKW	—	RO

Set: 4.0 – PRIVACY WD
Doors: DA-111, DA-119

Qty	Description	Catalog Number	Finish	Mfr
3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Privacy Lock	49 8265 LNL	US32D	SA
1	Surf Overhead Stop	10-436	630	RF
1	Surface Closer	281 O	EN	SA
1	Kick Plate	K1050 10" x 2" LDW BEV CSK	US32D	RO
1	Mop Plate	K1050 6" x 1" LDW CSK BEV	US32D	RO
3	Silencer	608-RKW	—	RO

Set: 5.0 – STOREROOM FUNCTION WD/HM OUTSWINGING
Doors: DA-105, DA-107

Qty	Description	Catalog Number	Finish	Mfr
3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	10 8204 LNL	US32D	SA
1	Surface Closer	1431 CPS	EN	SA
1	Kick Plate	K1050 10" x 2" LDW BEV CSK	US32D	RO
3	Silencer	608-RKW	—	RO

Set: 6.0 – ALSF CLASSROOM FUNCTION WD/HM
Doors: DA-100, DA-101, DA-108, DA-121, DA-122, DA-106

Qty	Description	Catalog Number	Finish	Mfr
3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Lock	10 8237 LNL	US32D	SA
1	Surface Closer	1431 O	EN	SA
1	Wall Stop	406	US32D	RO
1	Perimeter Seals	By Aluminum Storefront Manufacturer	—	OT

Set: 7.0 – INTERIOR SINGLE WD
Doors: DA-113

Qty	Description	Catalog Number	Finish	Mfr
3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	10 8204 LNL	US32D	SA
1	Surface Closer	281 CPS	EN	SA
1	Kick Plate	K1050 10" x 2" LDW BEV CSK	US32D	RO
1	Threshold	2005AT	—	PE
1	Gasketing	2891AV	—	PE
1	Door Sweep	345CNB	—	PE
1	Position Switch	DPS-M-BK	—	SU

Set: 8.0 – EXTERIOR SINGLE HM
Doors: DA-109, DA-103
Note: Authorized credentials retract latch bolt for entry; door relocks upon closing. REX in rail allows free exit. Fail secure. Key override at all times.

Qty	Description	Catalog Number	Finish	Mfr
3	Hinge (NRP)	5BB1 4.5 x 4.5 NRP	630	IVE
1	Storeroom Lock	T581HD7 DANE	626	FAL
1	SFIC Const. Core	C607CCA	—	FAL
1	Permanent SFIC Core	80-036	626	SCH
1	OH Stop	90S	630	GLY
1	Surface Closer	4050 RW/PA	689	LCN
1	Kick Plate	8400 10" x 2" LDW	630	IVE
3	Silencer	SR64	GY	IVE

Set: 9.0 – PR - WD - EXIT DEVICE - EAC
Doors: DA-114, DA-123
Note: Door normally closed and secured. Authorized credentials retract latch bolt for entry; door relocks upon closing. REX in rail allows free exit. Fail secure. Key override at all times.

Qty	Description	Catalog Number	Finish	Mfr
3	Electric Hinge	TA2714-QCXX-1/2" x 4-1/2"	US26D	MK
1	SVR Exit Device	43 NB8710 EO (Exit Only)	US32D	SA
1	SVR Exit Device	DG1 43 55 56 NB8706 ETMD	US32D	SA
1	Surface Closer	422 CTB2 / PCTB2 as required	EN	SA
1	Kick Plate	K1050 10" x 2" LDW	US32D	RO
1	Astragal Set	18061CNB	—	PE
1	Gasketing	S88BL X LAR	—	PE
1	ElectroLynx Harness	QC-C1500 (PS to hinge/strike)	—	MK
1	ElectroLynx Harness	QC-CXXP (Lock/exit to hinge)	—	MK
1	Card Reader	By security vendor	—	OT
1	Position Switch	DPS-XXXX - WH (as required)	—	SU
1	Power Supply	AQLXX - R8E1 (size as required)	—	SU

Set: 10.0 – SHARED ACCESS OFFICE/ENTRY FUNCTION
Doors: DA-104
Note: Door between two rooms requiring mutual access and security.

Qty	Description	Catalog Number	Finish	Mfr
3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Office/Entry Lock	10 8205 LNL	US32D	SA
1	Surface Closer	1431 CPS	EN	SA
1	Kick Plate	K1050 10" x 2" LDW (Single) BEV CSK	US32D	RO
3	Silencer	608-RKW	—	RO

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

RICHARD D. CHONG
REN. 06/30/27
STATE OF CALIFORNIA
REGISTERED ARCHITECT

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

DOOR AND WINDOW SCHEDULES

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

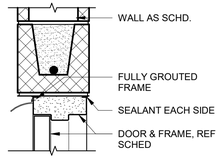
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

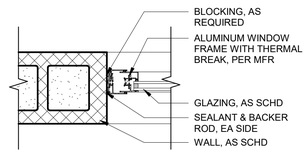
Sheet 45 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-9.1

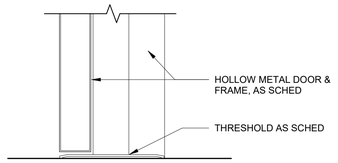
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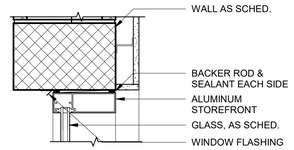
A CMU DOOR HEAD DETAIL
1 1/2" = 1'-0" VERT.



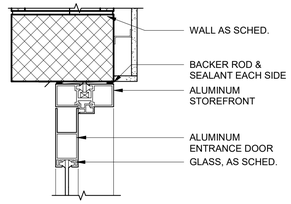
E CMU WINDOW JAMB DETAIL
1 1/2" = 1'-0" HORIZ.



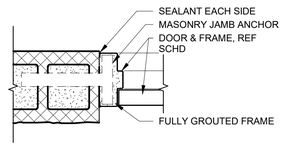
I INTERIOR DOOR THRESHOLD DETAIL
3" = 1'-0" VERT.



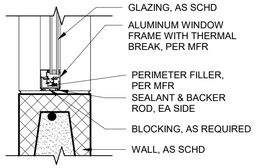
M STOREFRONT HEAD DETAIL
1 1/2" = 1'-0" VERT.



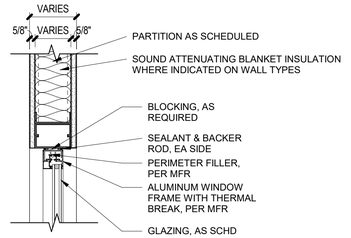
P STOREFRONT DOOR HEAD DETAIL
1 1/2" = 1'-0" VERT.



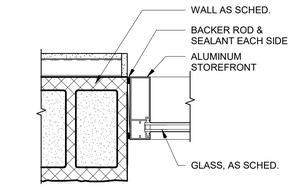
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1 1/2" = 1'-0" HORIZ.



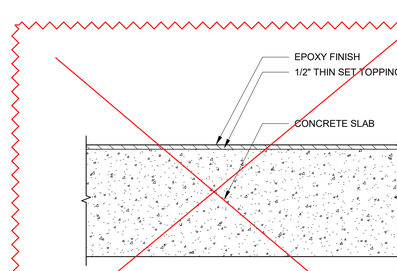
F CMU WINDOW SILL DETAIL
1 1/2" = 1'-0" VERT.



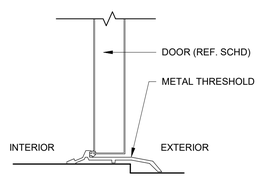
J WINDOW HEAD DETAIL
1 1/2" = 1'-0" VERT.



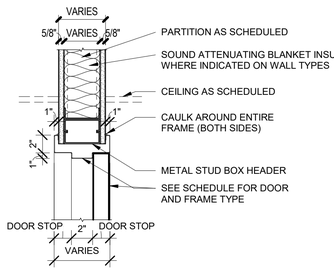
N STOREFRONT JAMB DETAIL
1 1/2" = 1'-0" HORIZ.



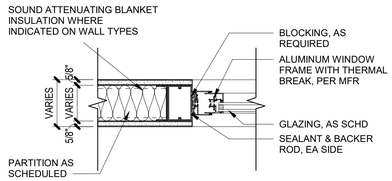
Q LAB FLOOR FINISH DETAIL
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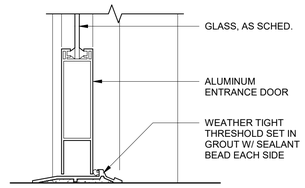
C DOOR THRESHOLD DETAIL
A-1.17 3" = 1'-0" VERT.



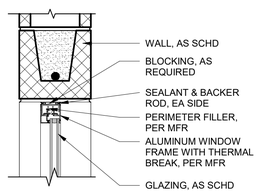
G DOOR HEAD DETAIL
1 1/2" = 1'-0" VERT.



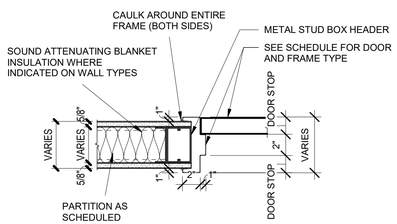
K WINDOW JAMB DETAIL
1 1/2" = 1'-0" HORIZ.



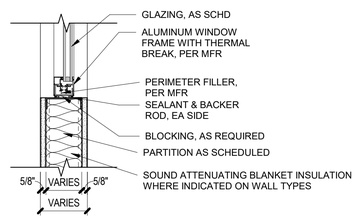
O STOREFRONT THRESHOLD DETAIL
3" = 1'-0" VERT.



D CMU WINDOW HEAD DETAIL
1 1/2" = 1'-0" VERT.



H DOOR JAMB DETAIL
1 1/2" = 1'-0" HORIZ.



L WINDOW SILL DETAIL
1 1/2" = 1'-0" VERT.

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT
RICHARD D. CHONG
No. 6117
REN. 08/30/27
STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

DOOR AND WINDOW DETAILS

Design by:	TIM KING	REVIEWED BY:	
Date:	MAY 2025		6/11/2025
Checked by:	RICHARD CHONG	Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200	DATE
Date:	MAY 2025	APPROVED BY:	
Drawn by:	DANIEL ARTEAGA		6/11/2025
Date:	MAY 2025	Goutam K. Dobey, City Engineer, RCE 75646	DATE
Checked by:	VALERIA NORATO	Sheet 46 of 126 Sheets	
Date:	MAY 2025	Scale Horiz. AS SHOWN	
		Vert. AS SHOWN	A-9.2

WW-00007

FINISH SCHEDULE

ROOM NAME	ROOM NUMBER	FLOOR		WALL										CEILING			NOTES
				NORTH		EAST		SOUTH		WEST		BASE					
		MATERIAL	FINISH	MATERIAL	FINISH	MATERIAL	FINISH	MATERIAL	FINISH	MATERIAL	FINISH	MATERIAL	DETAIL	MATERIAL	FINISH	HEIGHT	
~~MEDIA PREP~~	~~111~~	~~EPOXY~~	~~F1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~B2~~	~~2~~	~~ACT1~~	~~SPEC~~	~~9'-0"~~	
~~MICROBIOLOGY~~	~~112~~	~~EPOXY~~	~~F1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~B2~~	~~2~~	~~ACT1~~	~~SPEC~~	~~9'-0"~~	
~~CHEMISTRY LAB~~	~~113~~	~~EPOXY~~	~~F1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~B2~~	~~2~~	~~ACT1~~	~~SPEC~~	~~9' 0"~~	
~~MECH. EQUIP.~~	~~114~~	~~CONC~~	~~SEAL~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~B3~~	~~1~~	~~EXP~~			
~~STORAGE~~	~~115~~	~~CONC~~	~~SEAL~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~B3~~	~~1~~	~~ACT1~~	~~SPEC~~	~~9' 0"~~	
~~SAMPLE RECEIVING AND INDUSTRIAL WASTE STATION~~	~~116~~	~~EPOXY~~	~~F1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~B2~~	~~2~~	~~ACT1~~	~~SPEC~~	~~9' 0"~~	
~~SAMPLE RETENTION~~	~~117~~	~~EPOXY~~	~~F1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~B2~~	~~2~~	~~ACT1~~	~~SPEC~~	~~9' 0"~~	
~~INSTRUMENT LAB~~	~~118~~	~~EPOXY~~	~~F1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~B2~~	~~2~~	~~ACT1~~	~~SPEC~~	~~9'-0"~~	
CONFERENCE ROOM	119	LVT	F2	GYP	PT1	GYP	PT1	GYP	PT1	GYP	PT1	B1	1	ACT1	SPEC	9'-0"	
OFFICE 2	120	LVT	F2	GYP	PT1	GYP	PT1	GYP	PT1	GYP	PT1	B1	1	ACT1	SPEC	9'-0"	
UNISEX RESTROOM	122	TILE	CT1	TILE	CT2	TILE	CT2	TILE	CT2	TILE	CT2			GYP	PT2	9'-0"	
OFFICE 1	123	LVT	F2	GYP	PT1	GYP	PT1	GYP	PT1	GYP	PT1	B1	1	ACT1	SPEC	9'-0"	
OFFICE SUPPLIES/ MAIL/ COPY	124	LVT	F2	GYP	PT1	GYP	PT1	GYP	PT1	GYP	PT1	B1	1	ACT1	SPEC	9'-0"	
OFFICE 3	125	LVT	F2	GYP	PT1	GYP	PT1	GYP	PT1	GYP	PT1	B1	1	ACT1	SPEC	9'-0"	
CUBICLES	126	LVT	F2	GYP	PT1	GYP	PT1	GYP	PT1	GYP	PT1	B1	1	ACT1	SPEC	9'-0"	
LACTATION ROOM	127	LVT	F2	GYP	PT1	GYP	PT1	GYP	PT1	GYP	PT1	B1	1	ACT1	SPEC	9'-0"	
~~NON-HAZARDOUS STORAGE~~	~~128~~	~~CONC~~	~~SEAL~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~GYP~~	~~PT1~~	~~B3~~	~~1~~	~~ACT1~~	~~SPEC~~	~~9'-0"~~	
ELECTRICAL	129	CONC	SEAL	GYP	PT1	GYP	PT1	GYP	PT1	GYP	PT1	B3	1	EXP	SPEC	9'-0"	

FINISH LEGEND

F1
RESINOUS FLOORING
EPOXY COATING
MANUF: PERFORMANCE EPOXY COAT
EPOXY FLAKE COLORS: BLUE GRAY BLEND

F2
LUXURY VINYL TILE
MANUF: SHAW
STYLE NAME: GRAIN
STYLE NUMBER: 0364V
COLOR NAME: ANTLER
COLOR #: 64761
SIZE: 7"X 48"
CONSTRUCTION: 20 MIL FLOATING LVT
INSTALLATION: STAGGER

PT1
MANUF: SHERWIN WILLIAMS
COLOR: RHINESTONE
COLOR NUMBER: 7656
FINISH: LATEX EGG SHELL
LATEX FLAT AT CEILING

PT2
CEILING COLOR PAINT
MANUF: SHERWIN WILLIAMS
COLOR: HIGH REFLECTIVE WHITE
COLOR #: SW 7757
FINISH: LATEX FLAT

ACT1
ACOUSTIC CEILING PANEL
MANUF: ARMSTRONG
STYLE: CERAMAGUARD, FINE FISSURED
COLOR: WHITE
SIZE: AS SHOWN ON RCP

B1
BASE
MANUF: ROPPE RUBBER BASE
COLOR: 114 LUNAR DUST
SIZE 4"
PROFILE: COVE ROLL GOODS FIELD CORNERS

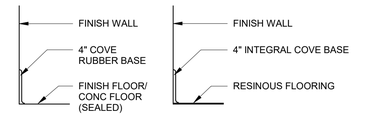
B2
INTEGRAL COVE BASE
COLOR #: MATCH F1 COLOR
SIZE 4" HIGH

B3
BASE
MANUF: ROPPE RUBBER BASE
COLOR: 195 LIGHT GRAY
PROFILE: COVE ROLL GOODS FIELD CORNERS

CT-1
PORCELAIN FLOOR TILE
MANUF: DALTILE
COLOR: DOVE GREY
COLOR #: PF04
FINISH: MATTE
SIZE: 24" X 24"

CT-2
PORCELAIN MOSAIC WALL TILE
COLOR: DOVE GREY
COLOR #: PF04
FINISH: MATTE
SIZE: 12" X 24"

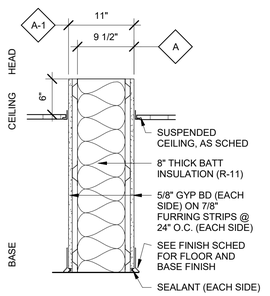
FLOOR BASE



1 RUBBER BASE

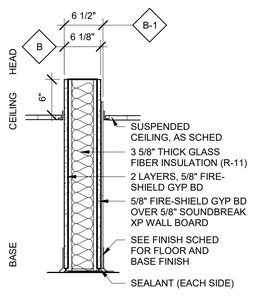
2 EPOXY BASE

PARTITION TYPES



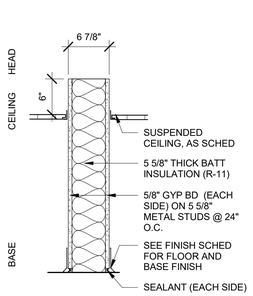
A 8" MTL STUDS @ 24" O.C. AND 5/8" GYP BD ONE SIDE

A-1 8" MTL STUDS @ 24" O.C. AND 5/8" GYP BD EACH SIDE

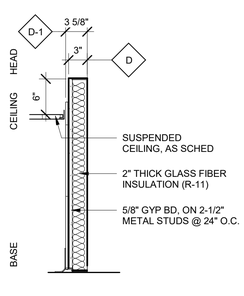


B 60 STC - 3 5/8" MTL STUDS @ 24" O.C. AND 2 LAYER GYP BD (EACH SIDE)

B-1 60 STC - 3 5/8" MTL STUDS @ 24" O.C. , 2 LAYER GYP BD (EACH SIDE) AND TILE ONE SIDE

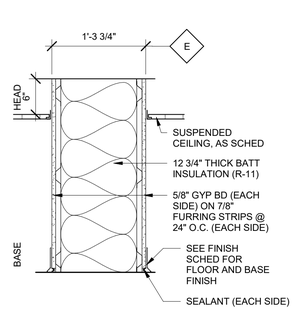


C 5 5/8" MTL STUDS @ 24" O.C.

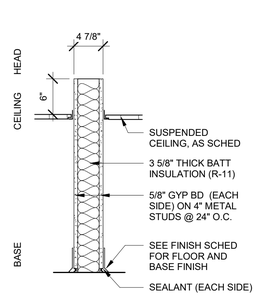


D 2 1/2" MTL STUDS @ 24" O.C. AND 5/8" GYP BD ONE SIDE

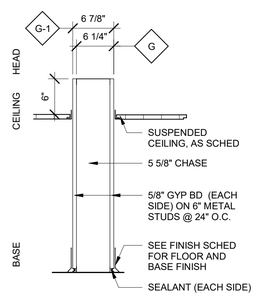
D-1 2 1/2" MTL STUDS @ 24" O.C. , 5/8" GYP BD AND TILE ONE SIDE



E 12 3/4" MTL STUDS @ 24" O.C. WITH 7/8" FURRING STRIPS 16" O.C. AND 5/8" GYP BD EACH SIDE

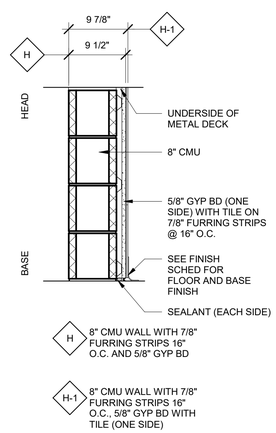


F 3 5/8" MTL STUDS @ 24" O.C. AND GYP BD EACH SIDE



G 5 5/8" MTL STUDS @ 24" O.C. AND 5/8" GYP BD ONE SIDE

G-1 5 5/8" MTL STUDS @ 24" O.C. AND 5/8" GYP BD EACH SIDE



H 8" CMU WALL WITH 7/8" FURRING STRIPS 16" O.C. AND 5/8" GYP BD

H-1 8" CMU WALL WITH 7/8" FURRING STRIPS 16" O.C., 5/8" GYP BD WITH TILE (ONE SIDE)

GENERAL PARTITION TYPES NOTES

REFER TO FLOOR PLANS TO DETERMINE THE LOCATION AND EXTENT OF PARTITION TYPES REQUIRED.

PROVIDE CEMENT BACKER BOARD, IN LIEU OF GYPSUM WALL BOARD, BEHIND ALL TILE LOCATIONS AT METAL STUD PARTITIONS.

PROVIDE BLOCKING PER SPECIFICATION REQUIREMENTS FOR ALL CASEWORK, COUNTERS, CABINETS, SHELVES, DOOR STOPS, RAILINGS, SPECIALTIES, MILLWORK AND OTHER ITEMS ATTACHED TO AND SUPPORTED FROM WALLS TO PROVIDE SOLID ATTACHEMENT.

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT
RICHARD D. CHONG
No. 31757
REN. 08/30/27
STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

FINISH SCHEDULE AND PARTITION TYPES

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

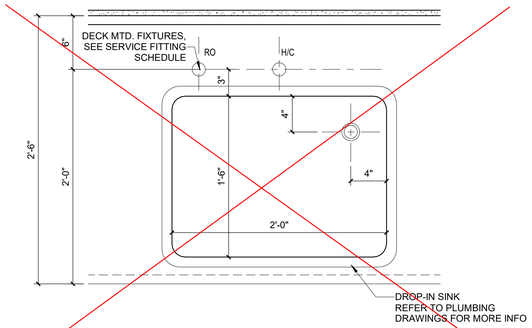
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 47 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

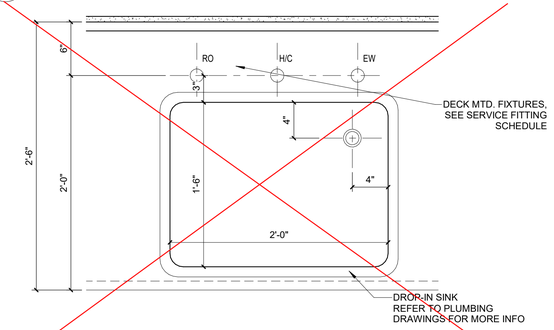
A-10.1

WW-00007



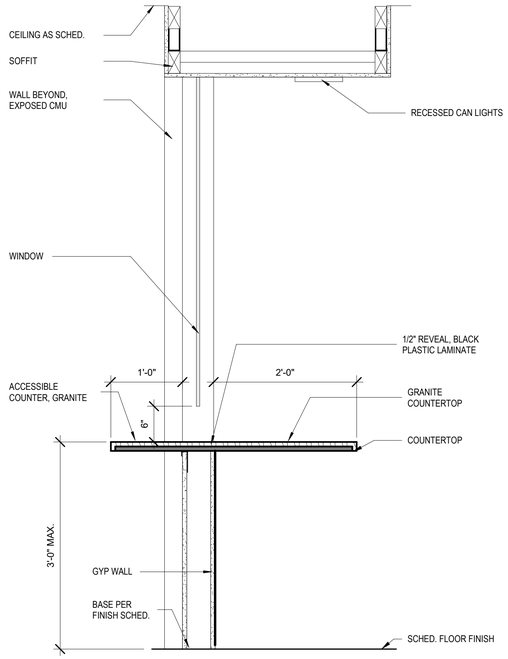
A S-2 EPOXY UNDERMOUNT SINK PLAN

1 1/2" = 1'-0" HORIZ.



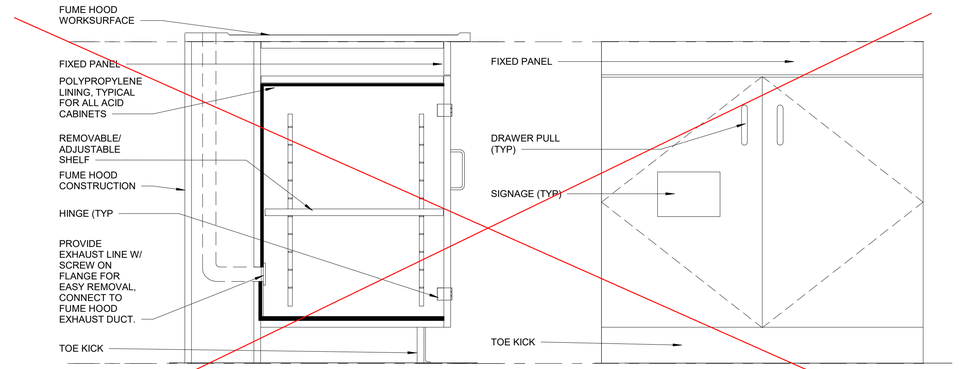
B S-3 EPOXY UNDERMOUNT SINK PLAN

1 1/2" = 1'-0" HORIZ.



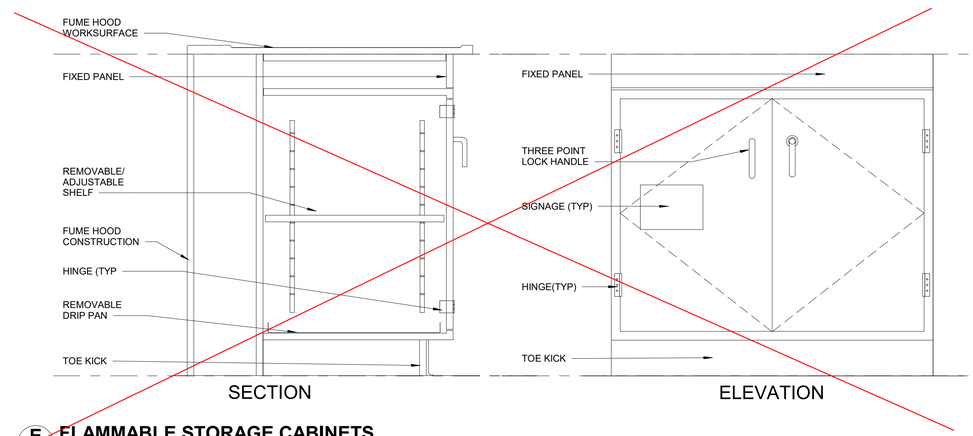
C TRANSACTION COUNTERTOP

1" = 1'-0" VERT.



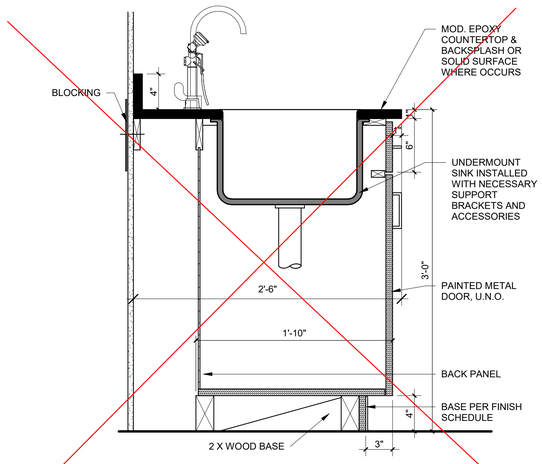
D ACID, CORROSIVE, AND BASE CABINET

1 1/2" = 1'-0" VERT.



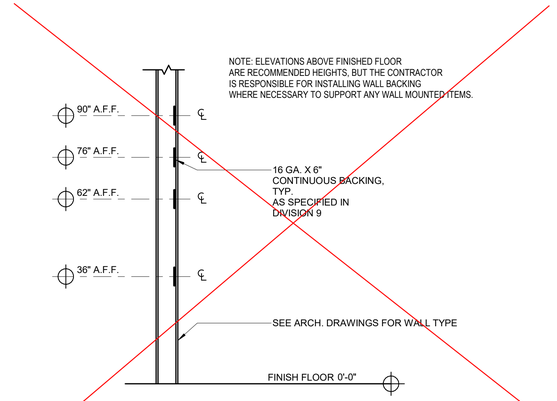
E FLAMMABLE STORAGE CABINETS

1 1/2" = 1'-0" VERT.



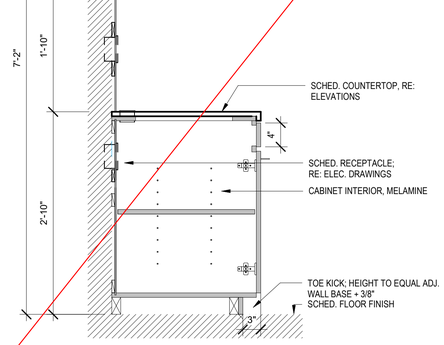
F SINK BASE CABINET DETAIL

1 1/2" = 1'-0" VERT.



G TYP. BACKING LOCATION UPPER & LOWER CASEWORK

1/2" = 1'-0" VERT.



H TOWER CABINET W/ BASE CABINETS

1" = 1'-0" VERT.

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Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT RICHARD D. CHONG No. C 31... REN. 08/30/27 STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

CASEWORK DETAILS

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

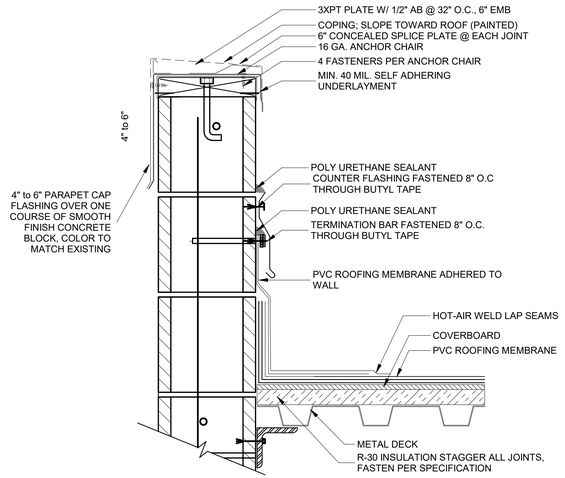
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 48 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

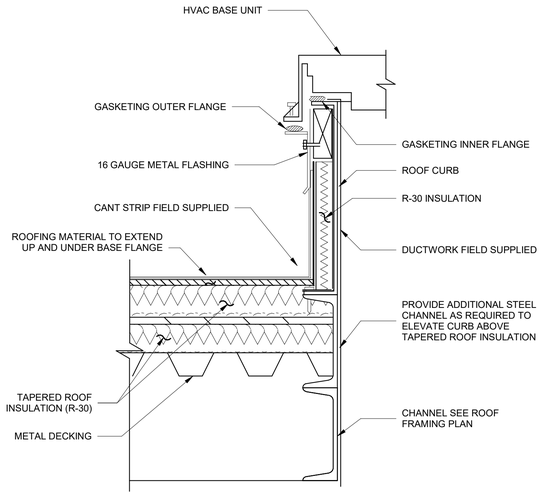
A-11.1

WW-00007



A SURFACE MOUNTED COUNTER FLASHING AND PARAPET CAP FLASHING

A-4.1 12" = 1'-0" VERT.

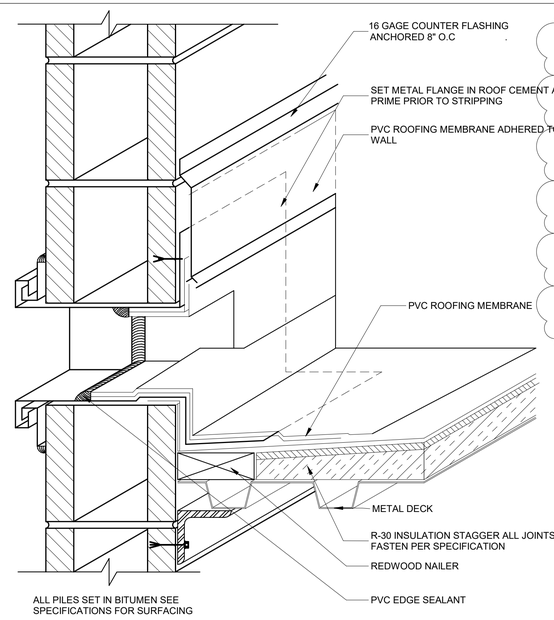


NOTES:

1. EDGE SEALANT IS REQUIRED ON ALL END LAPS, T-JOINTS, AND FIELD CUT EDGES.

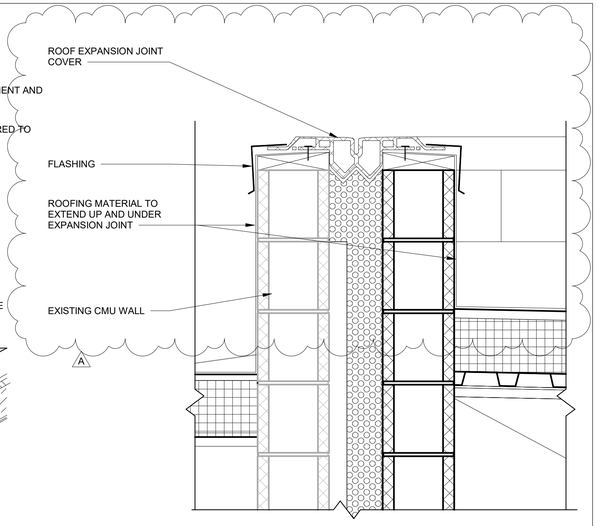
B AIR CONDITIONING ROOF CURB DETAIL

12" = 1'-0" VERT.



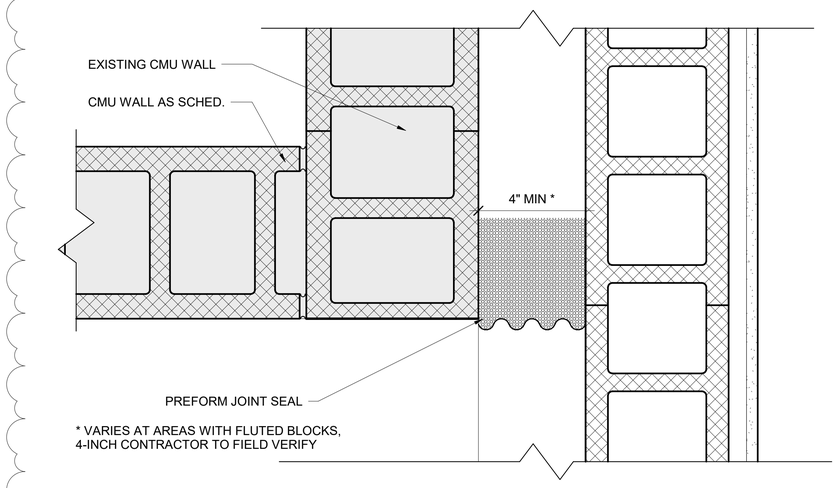
C OVERFLOW SCUPPER

12" = 1'-0" VERT.



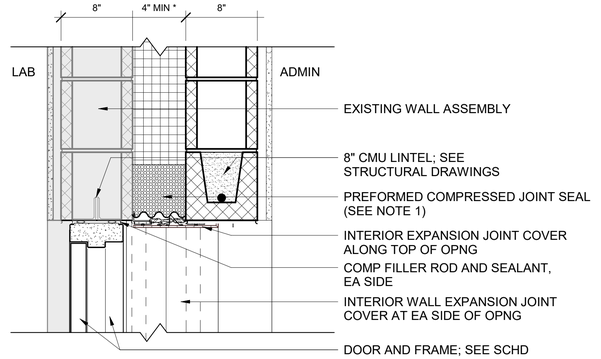
D ROOF PARAPET EXPANSION JOINT SECTION

– 1 1/2" = 1'-0" VERT.



E WALL CORNER EXPANSION JOINT SECTION

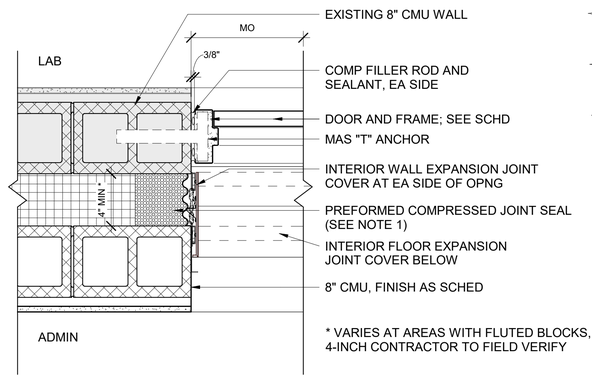
– 3" = 1'-0" HORIZ.



* VARIES AT AREAS WITH FLUTED BLOCKS, 4-INCH CONTRACTOR TO FIELD VERIFY

F DOOR HEAD AT EXISTING WALL

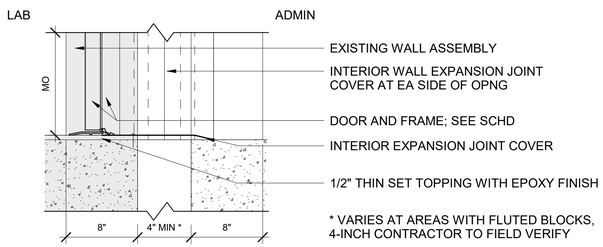
1 1/2" = 1'-0" VERT.



* VARIES AT AREAS WITH FLUTED BLOCKS, 4-INCH CONTRACTOR TO FIELD VERIFY

G DOOR JAMB AT EXISTING WALL

A-1.1 1 1/2" = 1'-0" HORIZ.



* VARIES AT AREAS WITH FLUTED BLOCKS, 4-INCH CONTRACTOR TO FIELD VERIFY

H DOOR THRESHOLD AT EXISTING WALL

A-1.17 1 1/2" = 1'-0" VERT.

GENERAL NOTES:

1. SEISMIC COLORSEAL IS HELD IN PLACE BY THE BACK-PRESSURE OF THE EXPANDING FOAM IN CONJUNCTION WITH A FIELD-INSTALLED BEAD OF SILICONE CAULK AT THE SUBSTRATE-TO-BELLOWS INTERFACE.

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
	Revisions			
A	ADDENDUM 1	08/15	VN	RC

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600 Wilshire Blvd
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LICENSED ARCHITECT RICHARD D. CHONG REN. 06/30/27 STATE OF CALIFORNIA

CITY OF REDLANDS
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JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

ROOF AND EXPANSION JOINT DETAILS

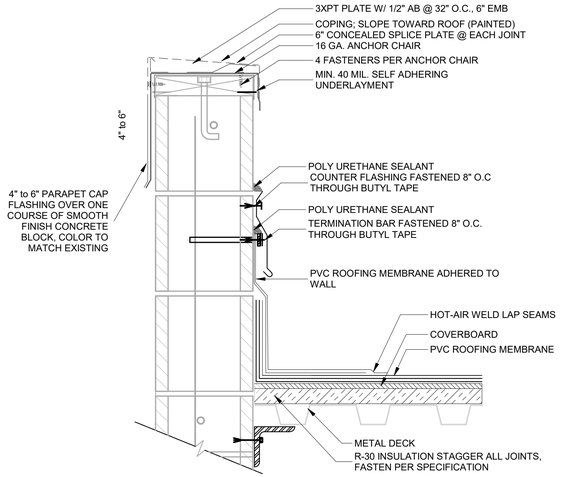
Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 49 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-12.1

WW-00007

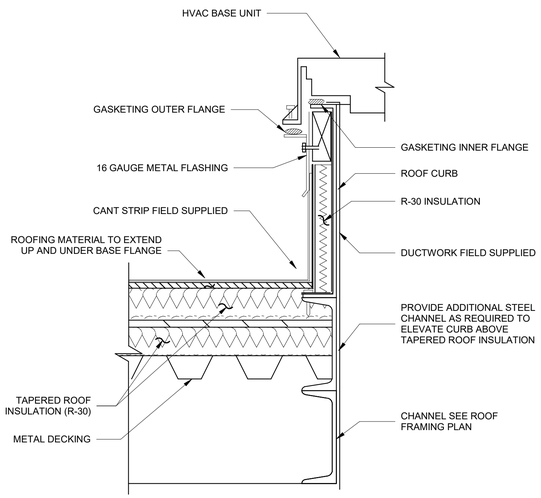


NOTES:

1. CONTRACTOR TO REMOVE CANT STRIP IF RECOMMENDED BY MANUF FOR WARRANTY PUPOSES
2. EDGE SEALANT IS REQUIRED ON ALL END LAPS, T-JOINTS, AND FIELD CUT EDGES.

A SURFACE MOUNTED COUNTER FLASHING AND PARAPET CAP FLASHING AT EXISTING

A-4.1 12" = 1'-0" VERT.

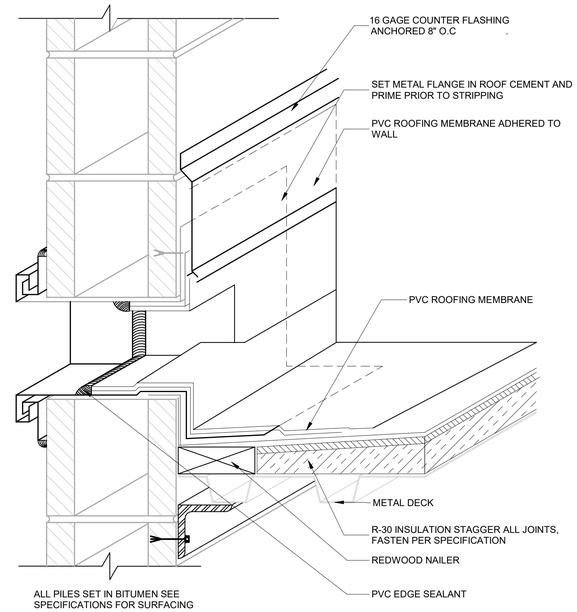


NOTES:

1. CONTRACTOR TO REMOVE CANT STRIP IF RECOMMENDED BY MANUF FOR WARRANTY PUPOSES
2. EDGE SEALANT IS REQUIRED ON ALL END LAPS, T-JOINTS, AND FIELD CUT EDGES.

B AIR CONDITIONING ROOF CURB DETAIL AT EXISTING

12" = 1'-0" VERT.

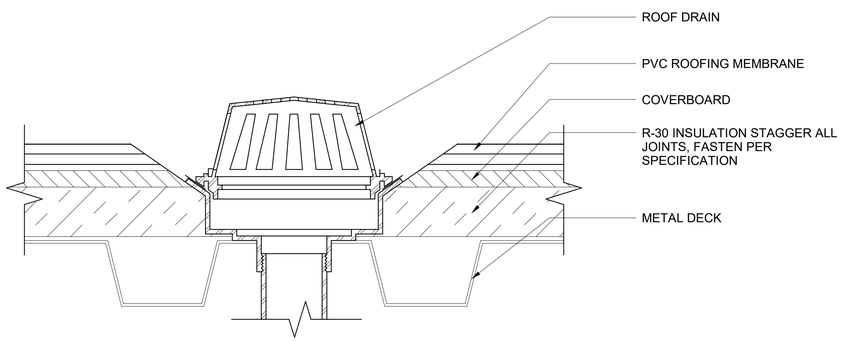


NOTES:

1. CONTRACTOR TO REMOVE CANT STRIP IF RECOMMENDED BY MANUF FOR WARRANTY PUPOSES
2. EDGE SEALANT IS REQUIRED ON ALL END LAPS, T-JOINTS, AND FIELD CUT EDGES.

C OVERFLOW SCUPPER AT EXISTING

12" = 1'-0" VERT.



D ROOF DRAIN DETAIL

3" = 1'-0" VERT.

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT
RICHARD D. CHONG
No. 8178
REN. 08/30/27
STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

ROOF AND EXPANSION JOINT DETAILS EXISTING

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

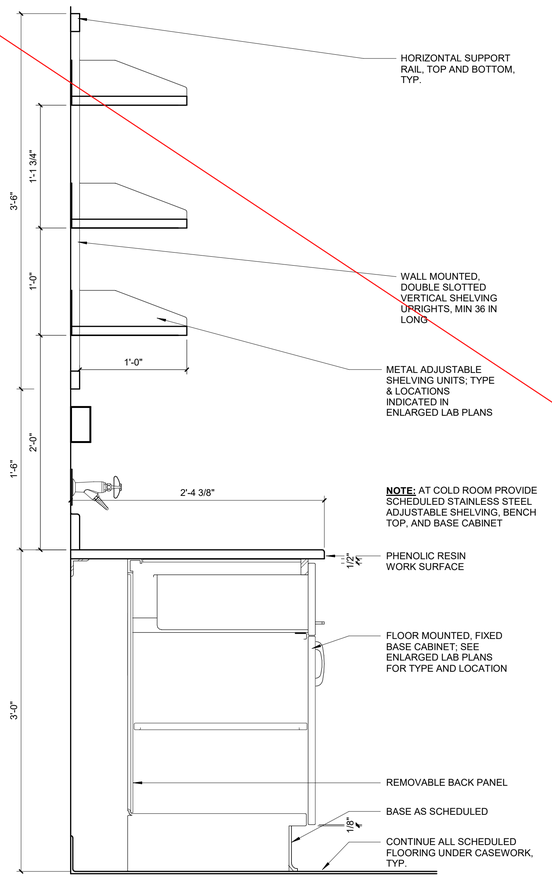
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 50 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

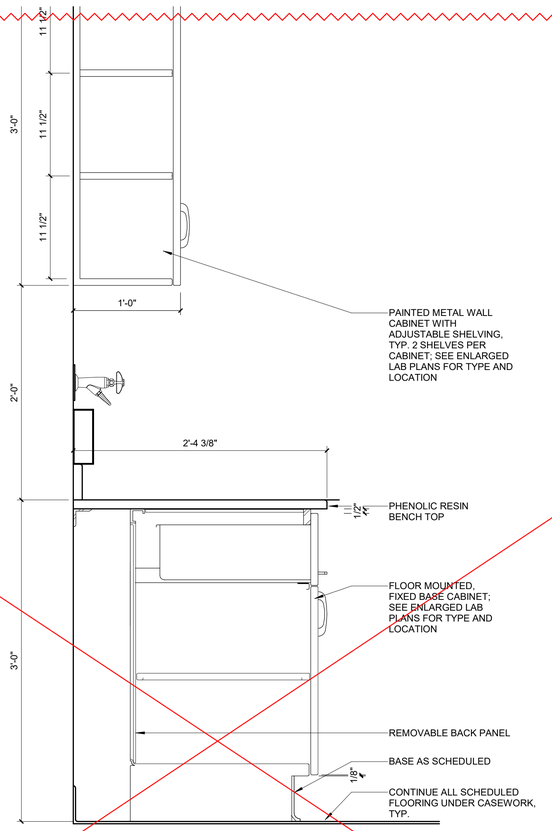
A-12.2

WW-00007

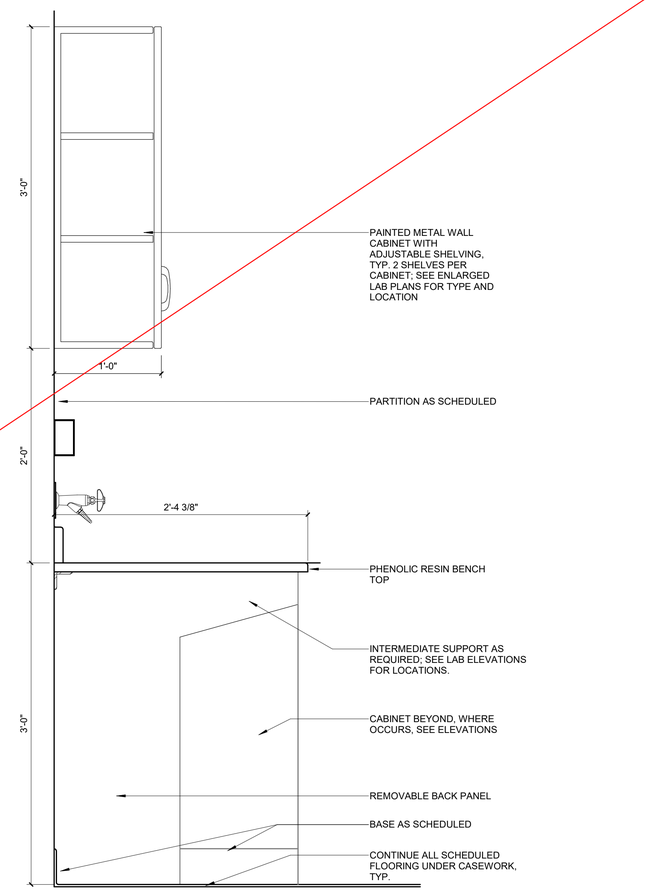
NOT IN SCOPE- PHASE 2



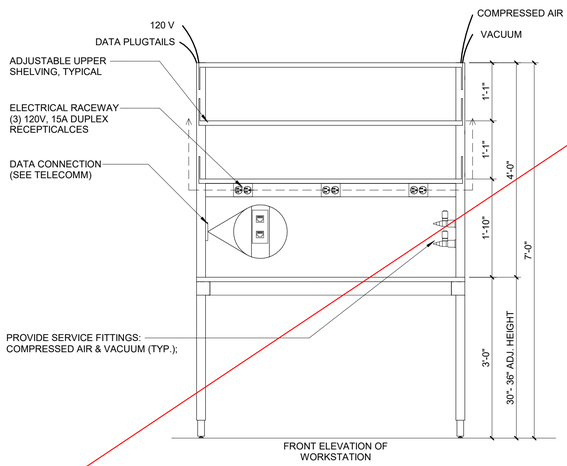
A CASEWORK SECTION - TYPICAL FLOOR MOUNTED, FIXED BENCH AT WALL WITH SHELVING
1 1/2" = 1'-0" VERT.



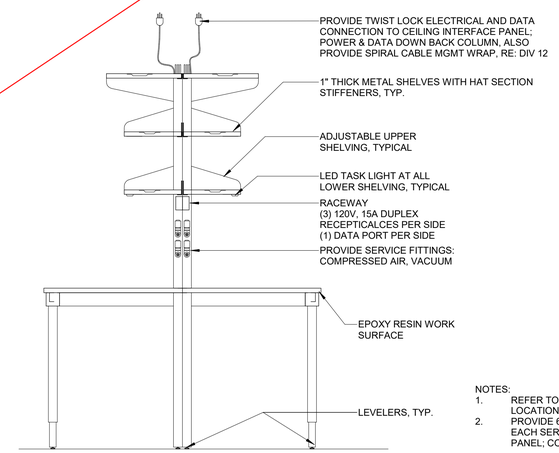
B CASEWORK SECTION - TYPICAL FLOOR MOUNTED, FIXED BENCH AT WALL
1 1/2" = 1'-0" VERT.



C CASEWORK SECTION - TYPICAL KNEESPACE AT FIXED BENCH AT WALL
1 1/2" = 1'-0" VERT.

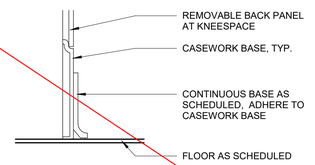


D TYPICAL BENCH ELEVATION
3/4" = 1'-0" VERT.

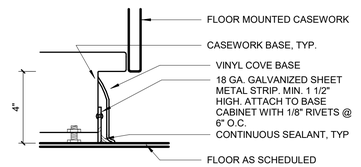


E TYPICAL BENCH SECTION
3/4" = 1'-0" VERT.

NOTES:
1. REFER TO ENLARGED LAB PLANS AND ENGINEERING DRAWINGS FOR LOCATIONS AND UTILITY LOCATIONS
2. PROVIDE 6'-0" LONG FLEX LINE WITH QUICK CONNECT DISCONNECT FOR EACH SERVICE INDICATED FOR CONNECTION TO THE CEILING SERVICE PANEL; COLOR OF FLEX LINES: WHITE.



F BASE DETAIL AT KNEESPACE
3" = 1'-0" VERT.



G TOE-KICK DETAIL TYP.
3" = 1'-0" VERT.

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT RICHARD D. CHONG REN. 08/30/27 STATE OF CALIFORNIA

5-14-2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

LABORATORY DETAILS 1

Design by:	TIM KING	
Date:	MAY 2025	
Checked by:	RICHARD CHONG	
Date:	MAY 2025	
Drawn by:	DANIEL ARTEAGA	
Date:	MAY 2025	
Checked by:	VALERIA NORATO	
Date:	MAY 2025	

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

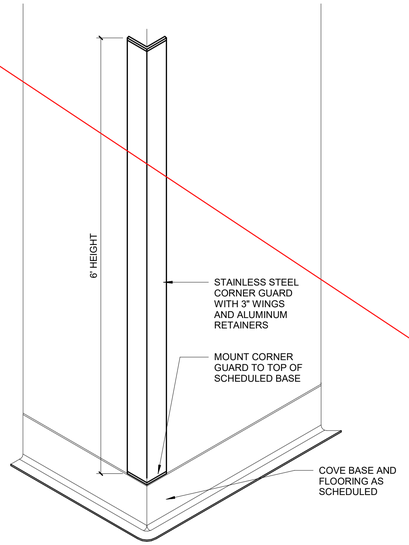
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 51 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

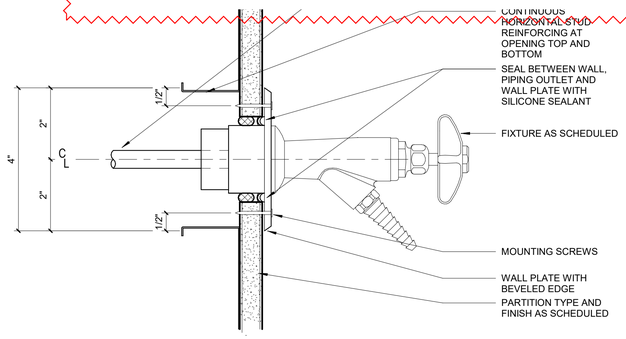
A-12.3

WW-00007

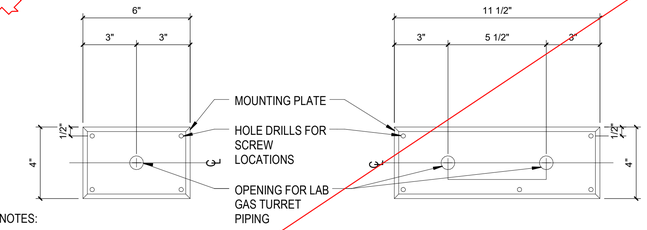
NOT IN SCOPE- PHASE 2



A **CORNER GUARD - 3D**
A-1.1 1 1/2" = 1'-0"



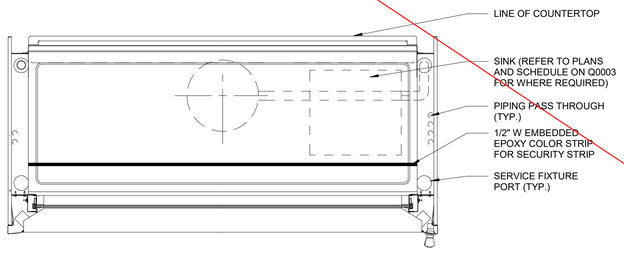
B **SINGLE NOZZLE FITTING THROUGH WALL DETAIL**
6" = 1'-0"



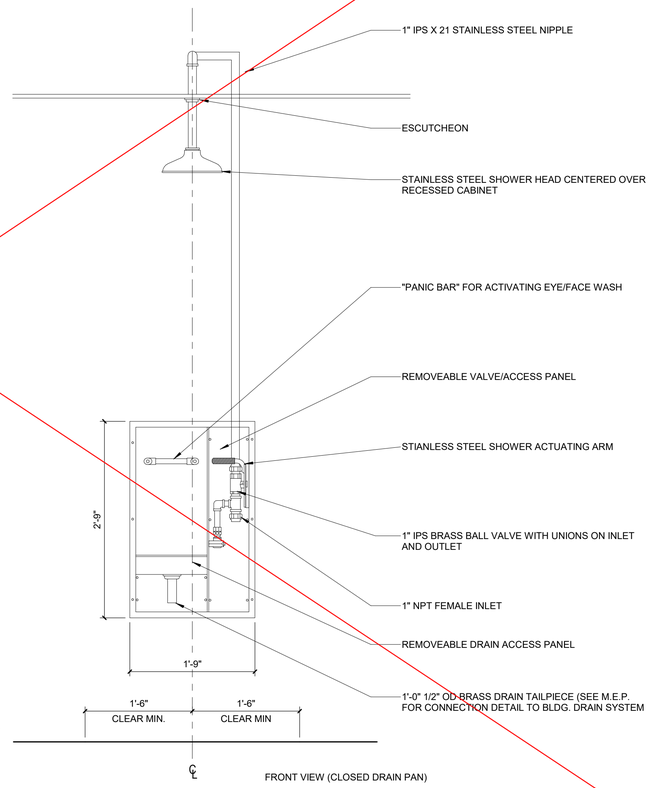
DETAIL NOTES:

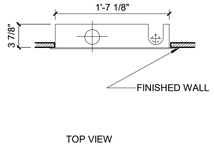
1. PLATE MATERIAL TO BE 1/8" SATIN FINISHED STAINLESS STEEL
2. EACH END OF PLATE SHALL BE ATTACHED TO WALL STUDS (OPTION ATTACHED TO STRAPPING W/CUTOUT FOR LAB GAS PIPING)
3. PLATE TO HAVE SLIGHTLY BEVELED EDGES
4. PLATE WILL BE MOUNTED USING (6) SHEET METAL BORING STAINLESS STEEL SCREWS
5. SEAL AT ALL EDGES

C **GAS NOZZLE MOUNTING PLATE**
3" = 1'-0"



6' FUME HOOD - PLAN



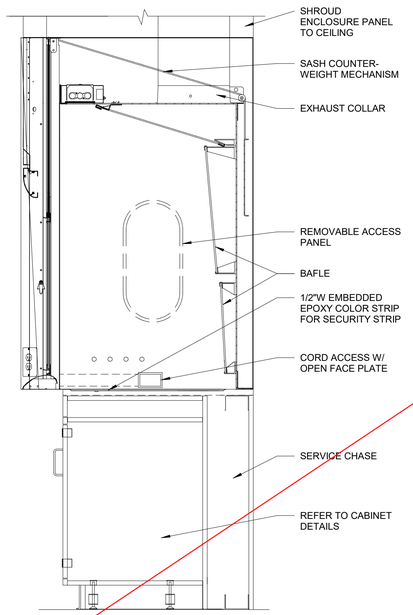


TOP VIEW

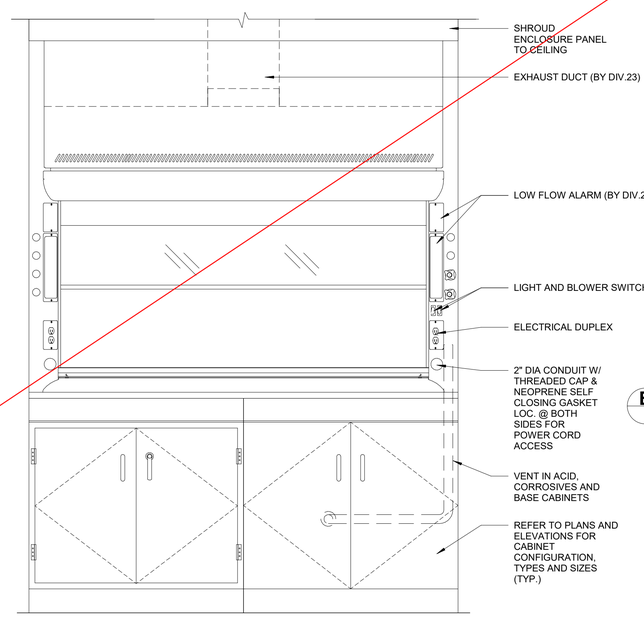
FRONT VIEW (CLOSED DRAIN PAN)

CROSS SECTION (OPENED DRAIN PAN)

E **ESS-1 BARRIER-FREE EMERGENCY SHOWER / EYEWASH**
1" = 1'-0"



SECTION



6' FUME HOOD - ELEVATION

D **FUME HOOD DETAILS**
1" = 1'-0"

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT RICHARD D. CHONG No. C 31... REN. 08/30/27 STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

LABORATORY DETAILS 2

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

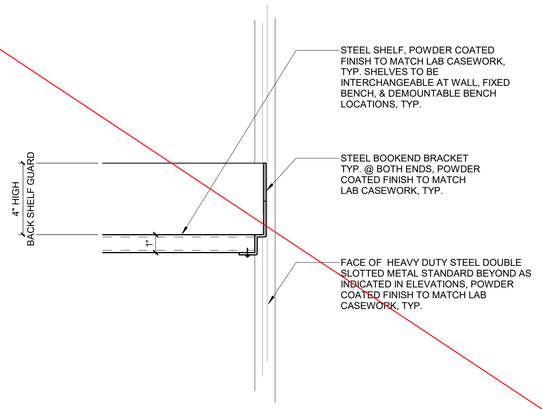
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 52 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-12.4

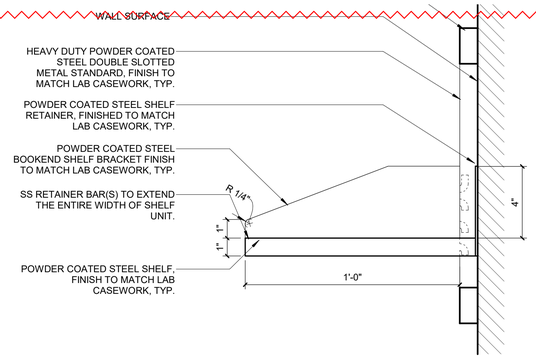
WW-00007

NOT IN SCOPE- PHASE 2



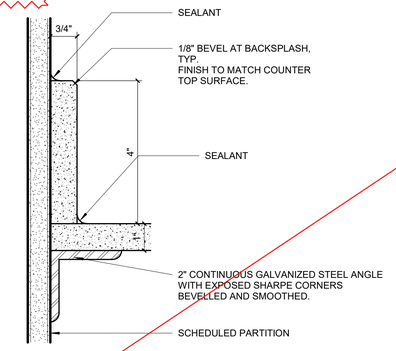
A ELEVATION ABOVE COUNTERTOP WALL SUSPENSION SYSTEM

3" = 1'-0" VERT.



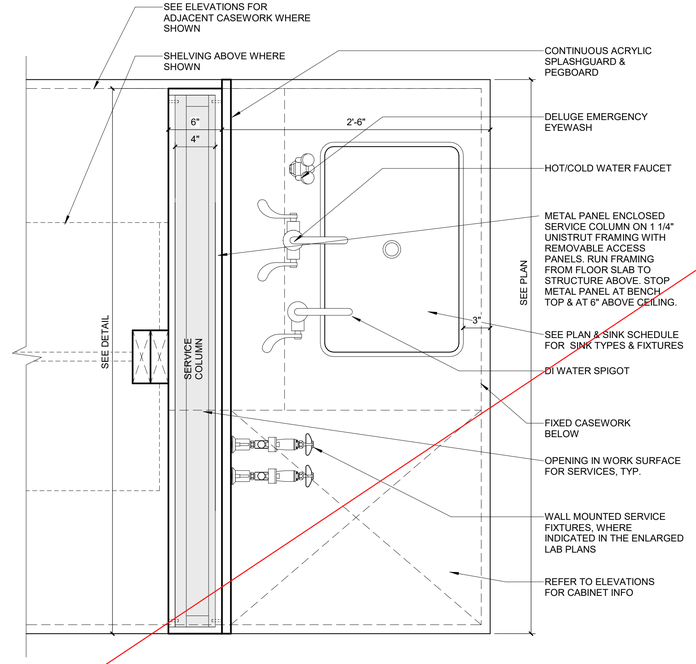
B TYP. DETAIL AT ABOVE COUTERTOP WALL SUSPENSION SYSTEM

3" = 1'-0" VERT.



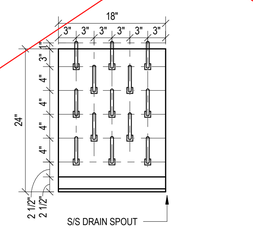
C BACKSPLASH SECTION DETAIL AT FLOOR MOUNTED, FIXED CASEWORK, TYP.

6" = 1'-0" VERT.

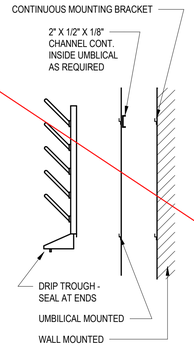


D TYPICAL FIXED SINK DETAIL WITH VERTICAL UTILITY CHASE LOCATED AS REQUIRED

1 1/2" = 1'-0" HORIZ.

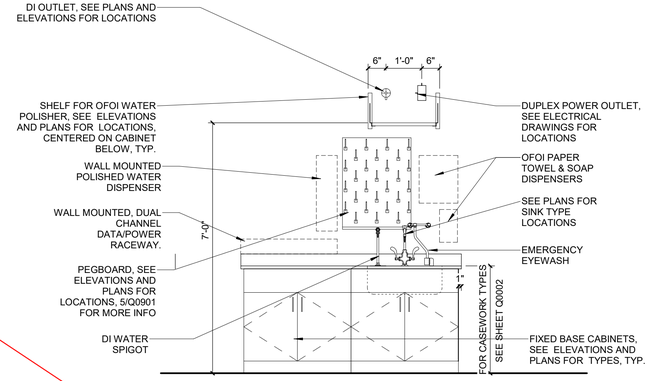


EPOXY OR 20 GA STAINLESS STEEL DRYING RACK W/ 1/2" D X 6" LONG POLYPROPYLENE PEGS. PROVIDE DRAIN HOSE TO SINK. (SEE PLANS AND ELEVATIONS FOR LOCATION)



E DRYING RACK DETAIL

1" = 1'-0" VERT.



F TYPICAL LABORATORY SINK ELEVATIONS

1/2" = 1'-0" VERT.

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED ARCHITECT RICHARD D. CHONG NO. C 8177 REN. 08/30/27 STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

LABORATORY DETAILS 3

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

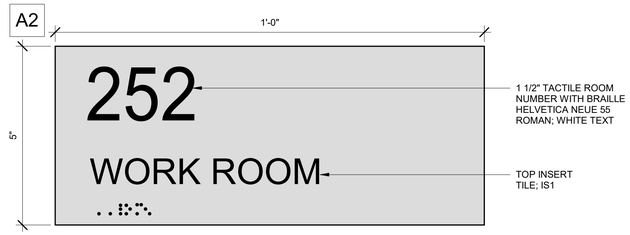
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 53 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-12.5

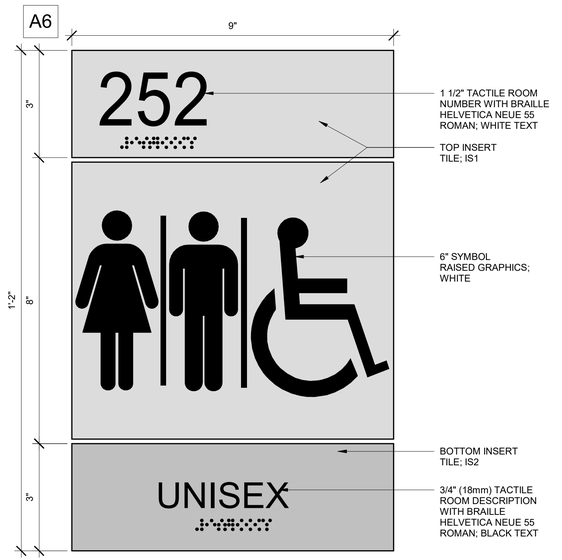
WW-00007



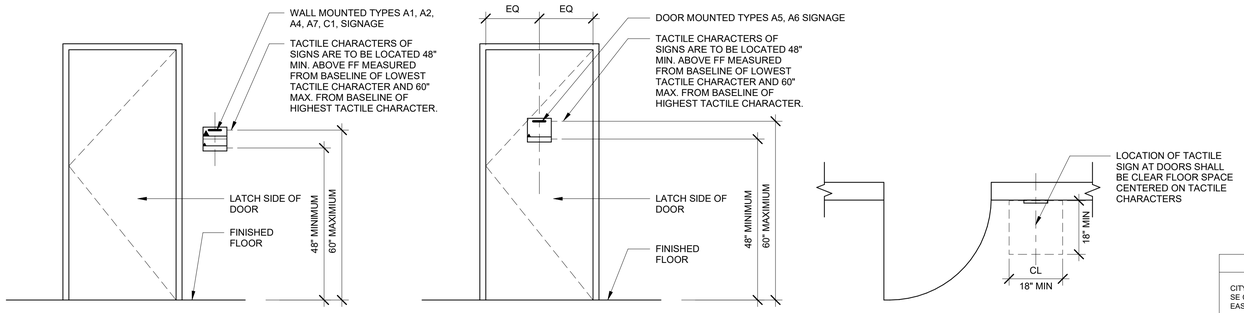
A **TYPE A2 STANDARD ROOM SIGN**
6" = 1'-0"



D **TYPE F2**
6" = 1'-0"



B **SIGN TYPE A6 - UNISEX**
6" = 1'-0"



C **SIGNAGE LOCATIONS**
1/2" = 1'-0"

GENERAL SIGNAGE NOTES:

1. CONTRACTOR TO VERIFY ROOM NUMBER, ROOM, OCCUPANT NAME, JOB TITLE, AND WORKSTATION NUMBER WITH OWNER PRIOR TO FABRICATION.
2. CONTRACTOR SHALL INSTALL INITIAL INSERT WITH TYPOGRAPHY AS SHOWN FOR SIGN TYPES A2. PROVIDE A TOOL-LESS SYSTEM WHERE TILES AND PAPER INSERTS MAY BE REMOVED AND CHANGED WITHOUT SPECIALTY TOOLS.
3. ALL SIGNAGE SHALL CONFORM WITH 2022 CBC ACCESSIBILITY GUIDELINES, INCLUDING BUT NOT LIMITED TO: PROPORTION, COLOR CONTRAST AND RELIEF, NOT HAVE SHARP OR ABRASIVE EDGES; RAISED CHARACTERS SHALL BE 1/32 INCH MINIMUM ABOVE BACKGROUND. ALL CHARACTERS SHALL BE UPPER CASE AND SANS SERIF. CHARACTER PROPORTIONS, STROKE THICKNESS, CHARACTER SPACING, LINE SPACING HEIGHT MINIMUM 5/8 INCH AND 2 INCH MAXIMUM. BRAILLE NOT TO BE MORE THAN 1/2 INCH BELOW THE LETTERS OR NUMBERS IT IS TRANSLATING.
4. REFERENCE SPECIFICATION SECTION 10 14 23.16 ROOM-IDENTIFICATION PANEL SIGNAGE FOR ADDITIONAL SIGNAGE TYPE CONSTRUCTION AND MATERIAL REQUIREMENTS.
5. CHARACTERS, PICTOGRAMS, SYMBOLS, AND BACKGROUNDS SHALL HAVE A NON-GLARE FINISH. CHARACTERS AND SYMBOLS SHALL CONTRAST WITH THEIR BACKGROUND.
6. SIGNAGE SHALL BE LOCATED ALONGSIDE DOOR AT LATCH SIDE AS SHOWN. WHERE SIGN IS PROVIDED AT DOUBLE DOORS WITH ONE ACTIVE LEAF, THE SIGN SHALL BE LOCATED ON THE INACTIVE LEAF. IF BOTH LEAFS ARE ACTIVE, SIGN SHALL BE LOCATED TO THE RIGHT OF THE RIGHT HAND DOOR. WHERE THERE IS NO WALL SPACE, SIGNS SHALL BE LOCATED ON THE NEAREST ADJACENT WALL. SIGNS CONTAINING TACTILE CHARACTERS SHALL BE LOCATED SO THAT A CLEAR FLOOR SPACE OF 18 INCHES BY 18 INCHES MINIMUM CENTERED ON THE TACTILE CHARACTERS IS PROVIDED BEYOND THE ARC OF ANY DOOR SWING BETWEEN THE CLOSED POSITION AND 45 DEGREE OPEN POSITION.

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

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LICENSED ARCHITECT
RICHARD D. CHONG
NO. C 31...
REN. 08/30/27
STATE OF CALIFORNIA

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

SIGNAGE TYPES DETAILS

Design by:	TIM KING	REVIEWED BY:	
Date:	MAY 2025		6/11/2025
Checked by:	RICHARD CHONG	Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200	DATE
Date:	MAY 2025	APPROVED BY:	
Drawn by:	DANIEL ARTEAGA		6/11/2025
Date:	MAY 2025	Goutam K. Dobey, City Engineer, RCE 75646	DATE
Checked by:	VALERIA NORATO	Sheet 54 of 126 Sheets	
Date:	MAY 2025	Scale Horiz. AS.SHOWN..	
		Vert. AS.SHOWN..	

A-12.6

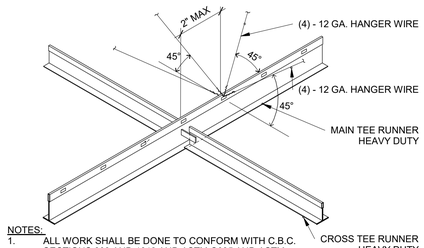
WW-00007

T-BAR CEILING	MAXIMUM SPAN	CEMCO STUD DESIGNATION	SPACING	CEILING TIES (BRACING) SPACING
	14'-7"	600S137-33	48"o.c.	MID-SPAN
	15'-8"	600S137-43	48"o.c.	MID-SPAN
	16'-8"	600S162-33	48"o.c.	MID-SPAN
	17'-11"	600S162-43	48"o.c.	MID-SPAN
	20'-0"	600S162-43	48"o.c.	6'-0" o.c. MAXIMUM
	24'-0"	800S162-43	48"o.c.	6'-0" o.c. MAXIMUM
	28'-0"	800S162-54	48"o.c.	6'-0" o.c. MAXIMUM
	32'-0"	1000S200-54	48"o.c.	6'-0" o.c. MAXIMUM
	36'-0"	1000S162-54	48"o.c.	6'-0" o.c. MAXIMUM

SUSPENDED CEILING SUPPORT JOISTS:

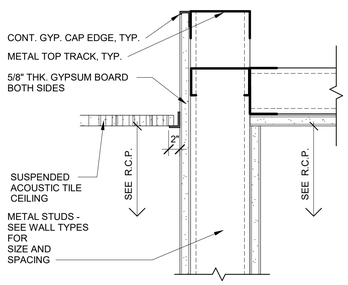
1. STEEL STUDS SHALL BE MANUFACTURED BY CEMCO IN CONFORMANCE WITH ICC-ESR 3016
2. STEEL STUDS SHALL BE OF 33 KSI STEEL EXCEPT 16 GA. (54 MIL)AND THICKER SHALL BE 50 KSI STEEL (YIELD STRENGTH).
3. CEILINGS TO BE SUSPENDED GRID SYSTEM WITH LIGHT FIXTURES ONLY. SHEATHING SHALL NOT BE APPLIED TO THE TOP OF JOISTS.
4. CEILINGS TO HAVE SUFFICIENT TOTAL ACCESS FROM BELOW, SUCH THAT ACCESS IS NOT REQUIRED WITHIN THE SPACE ABOVE THE CEILING.

A SUSPENDED CEILING SUPPORT JOIST
1 1/2" = 1'-0"

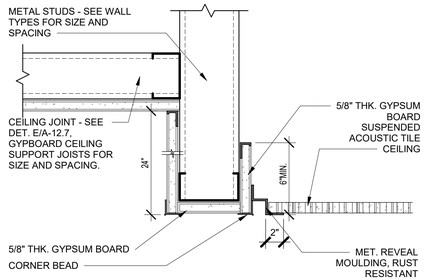


NOTES:
1. ALL WORK SHALL BE DONE TO CONFORM WITH C.B.C. SECTIONS 808 AND 1613 AND ASTM C635 AND ASTM C636.
2. ALL T-BAR CEILING SUSPENSION COMPONENTS TO BE HEAVY DUTY
3. PROVIDE SEISMIC TIES AS SHOWN AT 12'-0" O.C. EACH DIRECTION MAXIMUM SPACING AND 4'-0" FROM ALL WALLS. ICC-ESR-1308 SEE VERTICAL STRUT DETAIL

B T-BAR CEILING BRACING
1 1/2" = 1'-0"



C T-BAR CEILING/ HARD CEILING
1 1/2" = 1'-0"



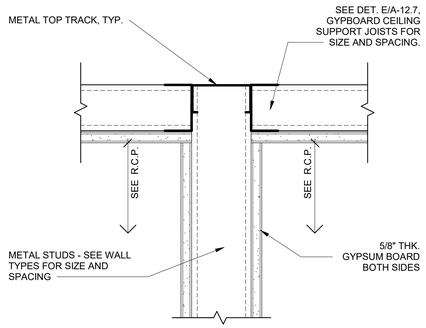
D GYP. BD. TO TILE CEILING TRANSITION
1 1/2" = 1'-0"

GYPBOARD CEILING	CEMCO STUD DESIGNATION	SPACING	MAXIMUM SPAN	
			CEILING TIES (BRACING) AT 4'-0" o.c. MAX	CEILING TIES (BRACING) AT MID-SPAN
	362S125-33	16" o.c.	9'-7"	9'-7"
	600S137-33	16" o.c.	12'-2"	14'-6"
	600S137-43	16" o.c.	13'-1"	16'-10"
	600S162-33	16" o.c.	14'-8"	14'-8"
	600S162-43	16" o.c.	16'-11"	19'-2"
	800S137-43	16" o.c.	14'-3"	20'-6"
	800S137-54	16" o.c.	15'-1"	24'-0"

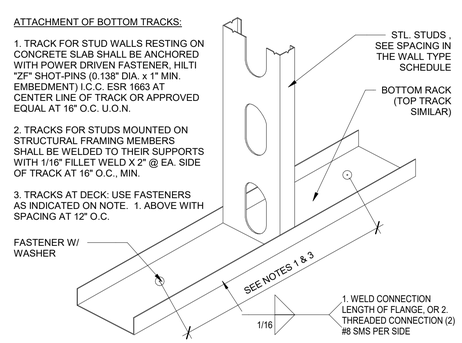
GYPBOARD CEILING SUPPORT JOISTS:

1. STEEL STUDS SHALL BE MANUFACTURED BY CEMCO IN CONFORMANCE WITH ICC-ESR 3016
2. STEEL STUDS SHALL BE OF 33 KSI STEEL EXCEPT 16 GA. (54 MIL)AND THICKER SHALL BE 50 KSI STEEL (YIELD STRENGTH).
3. WHERE CEILING SUPPORTED TOILET PARTITIONS OCCUR, USE 600S162-43 @ 16" O.C. UP TO 15'-0" MAXIMUM SPAN, WITH BRACING AT 4'-0" o.c. MAX.
4. EQUAL SIZE JOISTS WITH WIDER FLANGES MAY BE SUBSTITUTED FOR TYPE CALLED IN THE SCHEDULE.
5. STUD TRACKS SHALL BE UNPUNCHED STUDS OF SAME GAUGE AS STUD, U.N.O.
6. 3 5/8" x 18 GA. MIN. CEILING TIES (SEE SCHEDULE) WITH 1 - #8 SCREWS AT EACH JOIST. AT 16 GA. AND HEAVIER JOISTS CEILING TIE GAGE TO MATCH JOIST GAGE.
7. AT GYPBOARD CEILING, JOIST SPANS LISTED ARE FOR 1 LAYER OF 5/8" OR THINNER GYPBOARD

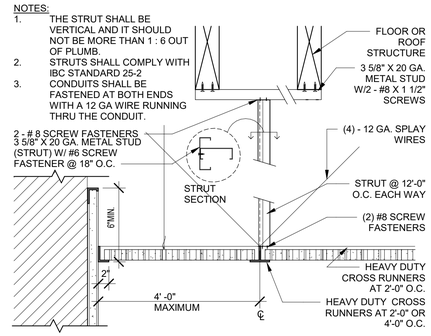
E GYP. BOARD CEILING SUPPORT JOIST
1 1/2" = 1'-0"



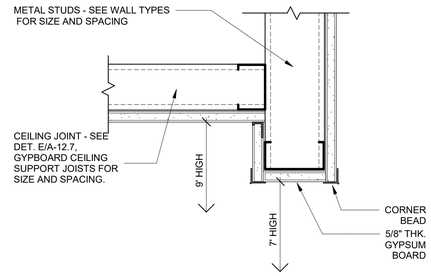
F HARD CEILING
1 1/2" = 1'-0"



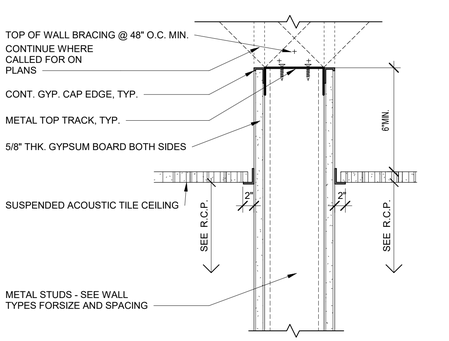
G BOTTOM TRACK
1 1/2" = 1'-0"



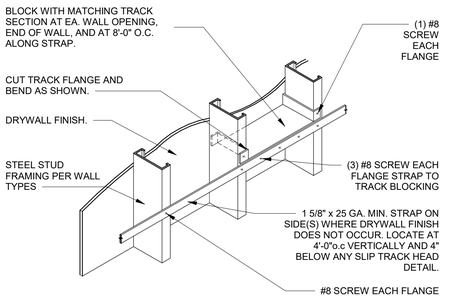
H CEILING STRUTS
1 1/2" = 1'-0"



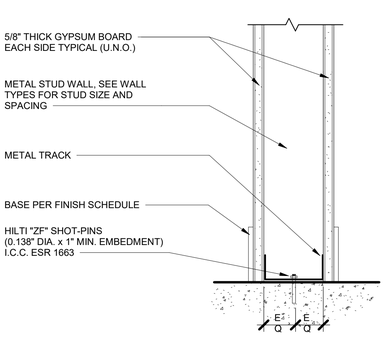
I CEILING TRANSITION
1 1/2" = 1'-0"



J TOP OF STUD WALL
1 1/2" = 1'-0"



K STUD WALL BRACING DETAIL
1 1/2" = 1'-0"



L METAL STUD WALL PLATE
1 1/2" = 1'-0"

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Tel. (213) 457-2200

LICENSED ARCHITECT RICHARD D. CHONG NO. C 8171 REN. 08/30/27 STATE OF CALIFORNIA

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

CEILING AND WALL FRAMING DETAILS

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 55 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-12.7

WW-00007

This document is used to demonstrate compliance with mandatory requirements in 110.8(g) and 120.7(b)/ 160.1 for newly constructed nonresidential, hotel/ motel, multifamily and mixed-use buildings, and 141.0(b)1/ 180.2 for alterations, related to roof, wall and floor assemblies. It is also used to demonstrate compliance with prescriptive requirements in 140.3/ 170.2 for newly constructed buildings, and 141.0/ 180.1/ 180.2 for additions and alterations, related to roof, wall, floor, door, fenestration and daylighting requirements.

Project Name: City of Redlands Joint Utilities Lab Building Renovation and Expansion Project | **Report Page:** (Page 1 of 18)
Project Address: 1950 Nevada Street | **Date Prepared:** 8/15/2025

A. GENERAL INFORMATION

01	Project Location (city)	Redlands	05	# of Stories (Habitable Above Grade)	1
02	Zipcode	92373	06	Total Conditioned Floor Area (ft²)	5753
03	Climate Zone	10	07	Total Unconditioned Floor Area (ft²)	0
04	Occupancy Types Within Project: (select all that apply): If one occupancy constitutes >= 80% of the conditioned floor area, the entire building envelope may be designed to comply with the provisions of that occupancy per 100.0(f).		08	☐ Project includes unconditioned enclosed space(s) > 5,000 ft² under a roof with a ceiling height of at least 15 ft.[1]	

● Office ● All Other Occupancies

[1] FOOTNOTE: Enclosed spaces > 5,000 ft² directly under roof with ceiling height > 15 ft in climate zones 2 through 15 are required to meet the minimum daylighting requirements defined in 140.3(c)/ 170.2(b). Compliance with 140.3(c)/ 170.2(b) is documented in Table L. This is the only prescriptive requirement which applies to unconditioned spaces.

B. PROJECT SCOPE

This table specifies project envelope components within the permit application demonstrating compliance using the prescriptive paths outlined in 140.3/ 170.2 and 141.0(a)1/ 180.1 and 141.0(b)1 and 2/ 180.2 for additions and alterations.

My project consists of (check all that apply)	Component Types					
	01			02		
☐ New Construction or Newly Conditioned Space	☐	Roof	☐	Walls	☐	Exterior Opaque Doors
☐ One or more enclosed spaces > 5,000 ft² directly under roof with ceiling height > 15ft			☐	Floors	☐	Fenestration/ Glazed Doors[1]
☒ Addition of conditioned space	☒	Roof	☒	Walls	☐	Exterior Opaque Doors
☐ One or more enclosed spaces > 5,000 ft² directly under roof with ceiling height > 15ft						
☐ Addition is <=700 ft²			☐	Floors	☒	Fenestration/ Glazed Doors[1]
☒ Addition is >700 ft²						
☒ Alteration of conditioned space	☒	Roof Assembly	☒	Walls		
☐ One or more enclosed spaces > 5,000 ft² directly under roof with ceiling height > 15ft and lighting system installed for the first time	☒	Roof Material[2]	☐	Floors	☒	Fenestration

B. PROJECT SCOPE

[1] FOOTNOTE: Doors that are more than 25% glass in area are considered Glazed Doors and should be documented on table K with fenestration.
[2] Roof recovers and replacements must also check "Roof Assembly" box and document compliance with insulation requirements in Table F. Roof recoats may document compliance with roof material only in Table G.

C. COMPLIANCE RESULTS

Results in this table are automatically calculated from data input and calculations in Tables F through L. Note: If any cell on this table says "COMPLIES with Exceptional Conditions" refer to Table D. Exceptional Conditions for guidance or see the applicable table referenced below.

Opaque Envelope Components					Fenestration	Daylighting Spaces > 5,000ft²	Compliance Results
Roof Assembly	Roofing Materials	Walls	Floors	Doors			
01	02	03	04	05	06	07	08
(See Table F)	(See Table G)	(See Table H)	(See Table I)	(See Table J)	(See Table K)	(See Table L)	COMPLIES
Yes	Yes	Yes			Yes		

D. EXCEPTIONAL CONDITIONS

This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.

E. ADDITIONAL REMARKS

This table includes remarks made by the permit applicant to the Authority Having Jurisdiction.

F. ROOF ASSEMBLY SCHEDULE

This table demonstrates compliance for prescriptive roof assembly requirements in 140.3(a)1B/ 170.2(a)1B for new construction, 141.0(a)/ 180.1 for additions, or 141.0(b)2Biii/ 180.2 for alterations,

01	Indicate roof types included in the project:	☒	Framed	☐	Framed-Multifamily	☐	SIPS	☐	Span Deck & Concrete	☐ Metal Panels	☐ Metal Building

Framed Roof Assemblies

01	02	Include Framed Roof Assemblies in Area-Weighted Average U-factor Calculation[1]		
		03	04	05	06

F. ROOF ASSEMBLY SCHEDULE

Framed Roof Assemblies

Tag/Plan Detail ID	Name/Description	Status	Exception to Roof Insulation Requirements in §141.0(b)2Biii (Alts. Only)	Occupancy Type
New Roof	Roof	New		Nonresidential/ Relocatable 1 CZ
New Roof	Roof	New		Nonresidential/ Relocatable 1 CZ
New Roof	Roof	New		Nonresidential/ Relocatable 1 CZ
New Roof	Roof	New		Nonresidential/ Relocatable 1 CZ
New Roof	Roof	New		Nonresidential/ Relocatable 1 CZ
New Roof	Roof	New		Nonresidential/ Relocatable 1 CZ
New Roof	Roof	New		Nonresidential/ Relocatable 1 CZ
New Roof	Roof	New		Nonresidential/ Relocatable 1 CZ
New Roof	Roof	New		Nonresidential/ Relocatable 1 CZ
New Roof	Roof	Altered		Nonresidential/ Relocatable 1 CZ
New Roof	Roof	Altered		Nonresidential/ Relocatable 1 CZ
New Roof	Roof	Altered		Nonresidential/ Relocatable 1 CZ
New Roof	Roof	Altered		Nonresidential/ Relocatable 1 CZ

F. ROOF ASSEMBLY SCHEDULE

Framed Roof Assemblies

Tag/Plan Detail ID	How Design U-factor was determined	Roof Type & Frame Material	Frame Spacing Depth	Cavity Insulation per Design[2]	Continuous Insulation per Design[2]	Thermal Performance Unit	Required Thermal Performance[3]	U-factor per Design		Net Area[4] ft²
New Roof	Roof	Altered								Nonresidential/ Relocatable 1 CZ
New Roof	Roof	Altered								Nonresidential/ Relocatable 1 CZ
New Roof	Roof	Altered								Nonresidential/ Relocatable 1 CZ
New Roof	Roof	New								Nonresidential/ Relocatable 1 CZ
New Roof	Roof	Altered								Nonresidential/ Relocatable 1 CZ
New Roof	Roof	Altered								Nonresidential/ Relocatable 1 CZ
07	08	09	10	11	12	13	14	15		16
Roof	JA4 Tables	Metal		0	30	U-factor	0.034	per JA4		165
								per Software/ Other	0.029	
Roof	JA4 Tables	Metal		0	30	U-factor	0.034	per JA4		165
								per Software/ Other	0.029	
Roof	JA4 Tables	Metal		0	30	U-factor	0.034	per JA4		130
								per Software/ Other	0.029	
Roof	JA4 Tables	Metal		0	30	U-factor	0.034	per JA4		270
								per Software/ Other	0.029	

F. ROOF ASSEMBLY SCHEDULE

07	08	09	10	11	12	13	14	15		16
Tag/Plan Detail ID	How Design U-factor was determined	Roof Type & Frame Material	Frame Spacing Depth	Cavity Insulation per Design[2]	Continuous Insulation per Design[2]	Thermal Performance Unit	Required Thermal Performance[3]	U-factor per Design		Net Area[4] ft²
Roof	JA4 Tables	Metal		0	30	U-factor	0.034	per JA4		660
								per Software/ Other	0.029	
Roof	JA4 Tables	Metal		0	30	U-factor	0.034	per JA4		107
								per Software/ Other	0.029	
Roof	JA4 Tables	Metal		0	30	U-factor	0.034	per JA4		155
								per Software/ Other	0.029	
Roof	JA4 Tables	Metal		0	30	U-factor	0.034	per JA4		67
								per Software/ Other	0.029	
Roof	JA4 Tables	Metal		0	30	U-factor	0.034	per JA4		66
								per Software/ Other	0.029	
Roof	JA4 Tables	Metal		0	30	U-factor	0.037	per JA4		232
								per Software/ Other	0.029	
Roof	JA4 Tables	Metal		0	30	U-factor	0.037	per JA4		250
								per Software/ Other	0.029	
Roof	JA4 Tables	Metal		0	30	U-factor	0.037	per JA4		805
								per Software/ Other	0.029	

F. ROOF ASSEMBLY SCHEDULE

07	08	09	10	11	12	13	14	15		16
Tag/Plan Detail ID	How Design U-factor was determined	Roof Type & Frame Material	Frame Spacing Depth	Cavity Insulation per Design[2]	Continuous Insulation per Design[2]	Thermal Performance Unit	Required Thermal Performance[3]	U-factor per Design		Net Area[4] ft²
Roof	JA4 Tables	Metal		0	30	U-factor	0.037	per JA4		291
								per Software/ Other	0.029	
Roof	JA4 Tables	Metal		0	30	U-factor	0.037	per JA4		181
								per Software/ Other	0.029	
Roof	JA4 Tables	Metal		0	30	U-factor	0.037	per JA4		291
								per Software/ Other	0.029	
Roof	JA4 Tables	Metal		0	30	U-factor	0.037	per JA4		478
								per Software/ Other	0.029	
Roof	JA4 Tables	Metal		0	30	U-factor	0.037	per JA4		208
								per Software/ Other	0.029	
Roof	JA4 Tables	Metal		0	30	U-factor	0.034	per JA4		420
								per Software/ Other	0.029	
Roof	JA4 Tables	Metal		0	30	U-factor	0.037	per JA4		562
								per Software/ Other	0.029	
Roof	JA4 Tables	Metal		0	30	U-factor	0.037	per JA4		250
								per Software/ Other	0.029	

A

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LICENSED ARCHITECT RICHARD D. CHONG NO. C-31... REN. 08/30/27 STATE OF CALIFORNIA

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

TITLE 24 CALCULATIONS AND FORMS 1

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 56 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-13.1

WW-00007

F. ROOF ASSEMBLY SCHEDULE

07	08	09	10	11	12	13	14	15	16
Tag/Plan Detail ID	How Design U-factor was determined	Roof Type & Frame Material	Frame Spacing Depth	Cavity Insulation per Design[2]	Continuous Insulation per Design[2]	Thermal Performance Unit	Required Thermal Performance[3]	U-factor per Design	Net Area[4] ft²

[1]FOOTNOTES: If any individual assembly is non-compliant, assemblies may show compliance using an area-weighted calculation. Metal building roofs may not be combined with other roof types. The area-weighted compliance option is not available for alterations demonstrating compliance with R-values in Table 141.0-C.
[2] For alterations using U-factor as the Thermal Performance Unit, at least R-10 insulation must be above deck.
[3] If "R-value" is shown in cell 13 as the Thermal Performance Unit, the R-value shown here is for continuous insulation per Table 141.0-C.
[4] Roof area minus any fenestration/ skylight area

Area-Weighted Average U-factor Compliance Calculation for Framed/ SIPs/ Span Deck & Concrete/ Metal Panel Roofs

01	02	03	04	05
Roof Type	Total Area of Roof Type (ft²)	Area-weighted U-factor for Roof Type		Compliance Results Using Area-Weighted Calculation Option
		Required	Designed	
Framed	5753	0.036	0.029	
Total for all Roof Types:	**5753**	**0.034**	**0.029**	**COMPLIES**

G. RATED ROOFING MATERIAL (COOL ROOF)

This table demonstrates compliance with prescriptive roof material requirements in 140.3(a)1A/ 170.2(a)1A for new construction, 141.0(a)/ 180.1 for additions, and 141.0(b)2B/ 180.2 for alterations. Roof recovers and replacements must also document compliance with insulation requirements in Table F. Roof recoats may document compliance with roof material only in Table G.

01	02	03	04	05	06	07	08		09		10
Tag/Plan Detail ID	Name/ Description/ Location	Status	Occupancy Type	Roof Slope	Roof Material	Compliance Method	Required Minimum Material Performance		Designed Material Performance		U-factor / R-value of Assembly
New Roof	Roof	Altered	Nonresidential	Low slope	To Be Determined	Aged solar reflectance and thermal emittance	Reflectance	0.63	Reflectance[1]	0.65	
							Emittance	0.75	Emittance	0.75	
							SRI		SRI		

H. WALL ASSEMBLY SCHEDULE

This table demonstrates compliance with prescriptive wall assembly requirements in 140.3(a)/ 170.2(a) for new constructions, 141.0(a)/ 180.1 for additions and 141.0(b)1B/ 180.2 for alterations.

01 Indicate wall types included in the project:[1] ☐ Framed ☒ Mass (new only) ☐ Concrete Sandwich Panel (new only) ☐ SIPS ☐ ICF (new only) ☐ Metal Panels ☐ Metal Building ☐ Spandrel/ Curtain Wall ☐ Straw Bale ☐ Log Home (new only)

[1] FOOTNOTES: Wall types indicated above as "(new only)" do not have Title 24, Part 6 requirements for alterations. New construction and additions do have requirements and should be clicked above and compliance demonstrated within this table.

Mass Walls (new walls only)

01 ☒ Calculate Area-Weighted Average U-factor for Mass Walls[1]

02	03	04	05	06	07	08	09	10	11		12
Tag/Plan Detail ID	Occupancy Type	How Design U-factor was determined	Mass Information			Additional Insulation Information		Maximum U-factor Allowed[2]	U-factor per Design		Net Area[3] ft²
			Mass Material	Fill Options	Thickness (in)	Frame Material & Thickness	Cavity Insulation per Design		per JA4		
Exterior Wall - N	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	92
Exterior Wall - W	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	25
Exterior Wall - N	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	97
Exterior Wall - W	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	25

H. WALL ASSEMBLY SCHEDULE

02	03	04	05	06	07	08	09	10	11		12
Tag/Plan Detail ID	Occupancy Type	How Design U-factor was determined	Mass Information			Additional Insulation Information		Maximum U-factor Allowed[2]	U-factor per Design		Net Area[3] ft²
			Mass Material	Fill Options	Thickness (in)	Frame Material & Thickness	Cavity Insulation per Design		per JA4		
Exterior Wall - E	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	93
Exterior Wall - N	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	175
Exterior Wall - W	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	27
Exterior Wall - E	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	217
Exterior Wall	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	141
Exterior Wall - E	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	92

H. WALL ASSEMBLY SCHEDULE

02	03	04	05	06	07	08	09	10	11		12
Tag/Plan Detail ID	Occupancy Type	How Design U-factor was determined	Mass Information			Additional Insulation Information		Maximum U-factor Allowed[2]	U-factor per Design		Net Area[3] ft²
			Mass Material	Fill Options	Thickness (in)	Frame Material & Thickness	Cavity Insulation per Design		per JA4		
Exterior Wall - E	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	140
Exterior Wall - S	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	90
Exterior Wall - N	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	90
Exterior Wall - N	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	175
Exterior Wall - W	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	157
Exterior Wall - S	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	75

H. WALL ASSEMBLY SCHEDULE

02	03	04	05	06	07	08	09	10	11		12
Tag/Plan Detail ID	Occupancy Type	How Design U-factor was determined	Mass Information			Additional Insulation Information		Maximum U-factor Allowed[2]	U-factor per Design		Net Area[3] ft²
			Mass Material	Fill Options	Thickness (in)	Frame Material & Thickness	Cavity Insulation per Design		per JA4		
Exterior Wall - W	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	152
Exterior Wall - N	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	144
Exterior Wall - W	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	135
Exterior Wall - W	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	151
Exterior Wall - S	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	323
Exterior Wall - W	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	90

H. WALL ASSEMBLY SCHEDULE

02	03	04	05	06	07	08	09	10	11		12
Tag/Plan Detail ID	Occupancy Type	How Design U-factor was determined	Mass Information			Additional Insulation Information		Maximum U-factor Allowed[2]	U-factor per Design		Net Area[3] ft²
			Mass Material	Fill Options	Thickness (in)	Frame Material & Thickness	Cavity Insulation per Design		per JA4		
Exterior Wall - S	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	360
Exterior Wall - E	Nonresidential/ Relocatable 1 CZ	JA4 Tables	CMU medium weight	Solid Grout	8 in	No frame type- any Thick 0.50 in	0	0.65	per Software/ Other	0.57	170

[1]FOOTNOTES: If any individual assembly is non-compliant, assemblies may show compliance using an area-weighted calculation. Mass walls are combined with concrete sandwich panel, log and ICF wall types. Mass walls must meet mandatory requirements in 120.7(b), but may area-weight to comply with prescriptive requirements in Table 140.3 for new construction.
[2] Mass walls are defined as "light" or "heavy" depending on their Heat Capacity. Heat Capacity is determined in Tables 4.3.5 and 4.3.6 in Joint Appendix 4. Walls with Heat Capacity of 15 or greater are "heavy" while walls with Heat Capacity from 7 to less than 15 are "light". Walls with heat capacity less than 7 would be categorized as "Wood framed and Other" for compliance purposes.
[3] Wall area minus any fenestration area

Area-Weighted Average U-factor Compliance Calculation for Mass/ Concrete Sandwich Panel/ Log/ ICF Walls

01	02	03	04		05	06
Wall Type	Total Area of Wall Type (ft²)	Mandatory U-factor Required	Area-weighted U-factor for Wall TypeArea-weighted U-factor for Wall Type			Compliance Results Using Area-Weighted Calculation Option
			Required		Designed	
Light Mass	0	0.44	0		0	COMPLIES
Heavy Mass	3236	0.69	0.65		0.57	COMPLIES

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LICENSED ARCHITECT RICHARD D. CHONG No. C-31127 REN. 08/30/27 STATE OF CALIFORNIA

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

TITLE 24 CALCULATIONS AND FORMS 2

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 57 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-13.2

WW-00007

I. FLOOR ASSEMBLY SCHEDULE

This section does not apply to this project.

J. EXTERIOR DOOR SCHEDULE

This section does not apply to this project.

K. FENESTRATION AND GLAZED DOOR SCHEDULE

This table demonstrates compliance with prescriptive fenestration requirements in 140.3(a)5/ 170.2(a)3 for new constructions, 141.0(a)/ 180.1 for additions, or 141.0(b)2A/ 180.2 for alterations. Exterior doors that are more than 25% glass in area are considered Glazed Doors and should be documented on this table with fenestration.

01	Indicate fenestration types included in the project:[1]	☐ Vertical (alterations)	☒ Vertical (new)	☐ Skylights	☐ Glazed Doors (new only)

[1] FOOTNOTES: Fenestration types indicated above as "(new only)" do not have Title 24, Part 6 requirements for alterations. New construction and additions do have requirements and should be clicked above and compliance demonstrated within this table.

Vertical Fenestration and Glazed Doors- Total Building & West Facing Area (New Construction & Additions Only)

01	02	03	04	05
Elevation Item Tag/ Description	Orientation (Azimuth)[1]	Gross Exterior Wall Area[2] (ft^2)	Display Perimeter Length[2] (ft)	Vertical Fenestration Area per Design[3] (ft^2)
North	North Facing	1070	0	312
East	East Facing	880	0	168
South	South Facing	1175	0	171
West	West Facing	832	0	70

06	Maximum Allowed Vertical Fenestration (ft^2)- All Orientations	1582.8	07	Total Vertical Fenestration (ft^2) per design- All Orientations	721
08	Maximum Allowed Vertical Fenestration (ft^2)- West Facing	332.8	09	Total Vertical Fenestration (ft^2) per design- West Facing	70

[1] FOOTNOTES: Orientation between 226 deg and 315 deg are considered "West Facing". A diagram has been provided in the Nonresidential Compliance Manual for visual reference.
[2] Do not include demising walls per 140.3(a)5 .
[3] Includes glazed door fenestration area .

K. FENESTRATION AND GLAZED DOOR SCHEDULE

Vertical Fenestration And Glazed Doors- U-factor, Solar Heat Gain Coefficient (RSHGC/ SHGC), Visible Transmittance (VT)

01	☒	Calculate Area-Weighted Average U-factor for Vertical Fenestration and Glazed Doors[1]
02	☒	Calculate Area-Weighted Average (R)SHGC for Vertical Fenestration and Glazed Doors[1]
03	☒	Calculate Area-Weighted Average VT for Vertical Fenestration and Glazed Doors[1]

Vertical Fenestration And Glazed Doors- U-factor, Solar Heat Gain Coefficient (RSHGC/ SHGC), Visible Transmittance (VT)

04	05	06	07	08	09	10	11	12	13
Tag/Plan Detail ID	Fenestration Type	Occupancy & Status	U-factor/ (R)SHGC Compliance Method	VT Compliance Method	Calculation Method for Performance Values per Design[2]	Product Performance Unit	Required Product Performance	Product Performance per Design	Area ft^2
Window	Fixed window	Nonresidential/ Relocatable 1 CZ: : New			NFRC Certified	U-factor (max)	0.36	0.36	63
					☐ Overhang/ Slats used for RSHGC	(R)SHGC (max)	0.25	0.25	
						VT (min)	0.42	0.5	
Window	Fixed window	Nonresidential/ Relocatable 1 CZ: : New			NFRC Certified	U-factor (max)	0.36	0.36	63
					☐ Overhang/ Slats used for RSHGC	(R)SHGC (max)	0.25	0.25	
						VT (min)	0.42	0.5	
Window	Fixed window	Nonresidential/ Relocatable 1 CZ: : New			NFRC Certified	U-factor (max)	0.36	0.36	42
					☐ Overhang/ Slats used for RSHGC	(R)SHGC (max)	0.25	0.25	
						VT (min)	0.42	0.5	
Window	Fixed window	Nonresidential/ Relocatable 1 CZ: : New			NFRC Certified	U-factor (max)	0.36	0.36	63
					☐ Overhang/ Slats used for RSHGC	(R)SHGC (max)	0.25	0.25	
						VT (min)	0.42	0.5	
Window	Fixed window	Nonresidential/ Relocatable 1 CZ: : New			NFRC Certified	U-factor (max)	0.36	0.36	54
					☐ Overhang/ Slats used for RSHGC	(R)SHGC (max)	0.25	0.25	
						VT (min)	0.42	0.5	

K. FENESTRATION AND GLAZED DOOR SCHEDULE

Vertical Fenestration And Glazed Doors- U-factor, Solar Heat Gain Coefficient (RSHGC/ SHGC), Visible Transmittance (VT)

04	05	06	07	08	09	10	11	12	13
Tag/Plan Detail ID	Fenestration Type	Occupancy & Status	U-factor/ (R)SHGC Compliance Method	VT Compliance Method	Calculation Method for Performance Values per Design[2]	Product Performance Unit	Required Product Performance	Product Performance per Design	Area ft^2
Window	Fixed window	Nonresidential/ Relocatable 1 CZ: : New			NFRC Certified	U-factor (max)	0.36	0.36	63
					☐ Overhang/ Slats used for RSHGC	(R)SHGC (max)	0.25	0.25	
						VT (min)	0.42	0.5	
Window	Fixed window	Nonresidential/ Relocatable 1 CZ: : New			NFRC Certified	U-factor (max)	0.36	0.36	60
					☐ Overhang/ Slats used for RSHGC	(R)SHGC (max)	0.25	0.25	
						VT (min)	0.42	0.5	
Window	Fixed window	Nonresidential/ Relocatable 1 CZ: : New			NFRC Certified	U-factor (max)	0.36	0.36	28
					☐ Overhang/ Slats used for RSHGC	(R)SHGC (max)	0.25	0.25	
						VT (min)	0.42	0.5	
Window	Fixed window	Nonresidential/ Relocatable 1 CZ: : New			NFRC Certified	U-factor (max)	0.36	0.36	28
					☐ Overhang/ Slats used for RSHGC	(R)SHGC (max)	0.25	0.25	
						VT (min)	0.42	0.5	
Window	Fixed window	Nonresidential/ Relocatable 1 CZ: : New			NFRC Certified	U-factor (max)	0.36	0.36	126
					☐ Overhang/ Slats used for RSHGC	(R)SHGC (max)	0.25	0.25	
						VT (min)	0.42	0.5	
Window	Fixed window	Nonresidential/ Relocatable 1 CZ: : New			NFRC Certified	U-factor (max)	0.36	0.36	14
					☐ Overhang/ Slats used for RSHGC	(R)SHGC (max)	0.25	0.25	
						VT (min)	0.42	0.5	

K. FENESTRATION AND GLAZED DOOR SCHEDULE

Vertical Fenestration And Glazed Doors- U-factor, Solar Heat Gain Coefficient (RSHGC/ SHGC), Visible Transmittance (VT)

04	05	06	07	08	09	10	11	12	13
Tag/Plan Detail ID	Fenestration Type	Occupancy & Status	U-factor/ (R)SHGC Compliance Method	VT Compliance Method	Calculation Method for Performance Values per Design[2]	Product Performance Unit	Required Product Performance	Product Performance per Design	Area ft^2
Window	Fixed window	Nonresidential/ Relocatable 1 CZ: : New			NFRC Certified	U-factor (max)	0.36	0.36	117
					☐ Overhang/ Slats used for RSHGC	(R)SHGC (max)	0.25	0.25	
						VT (min)	0.42	0.5	

[1] FOOTNOTES: If any individual fenestration product is non-compliant, products may show compliance using an area-weighted calculation. Chromogenic glazing is not included in area-weighted calculations. Area-weighted calculation shown in separate area-weighted table below.
[2] The NA6 Default Calculation can only be used for alterations or dwelling units in buildings with <= 3 habitable stories. Alterations are limited to 200ft^2 of site built glazing and dwelling units are limited to 250ft^2 or 5% of conditioned floor area. If the fenestration does not meet these conditions, the only options for determining fenestration values are NFRC Certification or the Default Tables in 110.6.
[3] Overhangs must extend past the left and right window the same distance as the depth of the overhang or greater to show an affect on the RSHGC. If an overhang does not meet this requirement, the affect of the overhang will be ignored.
[4] Projecting includes casement and awning windows.

Area-Weighted Average U-factor, SHGC, VT Compliance Calculation for Vertical Fenestration And Glazed Doors

01	02	03	04	05
Product Performance Unit	Total Area of Fenestration (ft^2)	Area-weighted Calculation for Fenestration		Compliance Results Using Area-Weighted Calculation Option
		Required	Designed	
U-Factor	721	0.36	0.36	COMPLIES
(R)SHGC	721	0.25	0.25	COMPLIES
VT	721	0.42	0.5	COMPLIES

L. DAYLIGHT IN LARGE ENCLOSED SPACES

This section does not apply to this project.

M. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

Selections have been made based on information provided in this document. If any selection have been changed by the permit applicant, an explanation should be included in Table E Additional Remarks. These documents must be provided to the building inspector during construction and can be found online

Form/Title
NRCI-ENV-01-E - Must be submitted for all buildings

N. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

Selections have been made based on information provided in previous tables of this document. If any selection needs to be changed, form user must provide an explanation in Table E Additional Remarks. These documents must be provided to the building inspector during construction and can be found online at https://www.energy.ca.gov/title24/2019standards/2019_compliance_documents/Nonresidential_Documents/NRCA/. Individuals who perform the field testing and verification work, and provide the information required for completion of the fenestration Certificate of Acceptance documentation are not required to be licensed professionals. However, the person who signs the Certificate of Acceptance document to certify compliance with the acceptance requirements shall be licensed as specified in Standards Section 10-103(a)4 and NA7.3.1

Form/Title	Systems/Spaces To Be Field Verified
NRCA-ENV-02-F must be submitted for all new, added or altered site built fenestration.	Fenestration;

O. DECLARATION OF REQUIRED CERTIFICATES OF VERIFICATION

There are no forms required for this project.

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name:	Documentation Author Signature:
Company: CDM Smith	Signature Date: 2025-08-15
Address:	CEA/ HERS Certification Identification (if applicable):
City/State/Zip:	Phone:

RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name:	Responsible Designer Signature:
Company: CDM Smith	Date Signed: 2025-08-15
Address: 2295 Gateway Oaks Drive, Suite 250	License:
City/State/Zip: Sacramento CA 95833	Phone:

A

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED ARCHITECT
RICHARD D. CHONG
No. C-31772
REN. 08/30/27
STATE OF CALIFORNIA

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

TITLE 24 CALCULATIONS AND FORMS 3

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

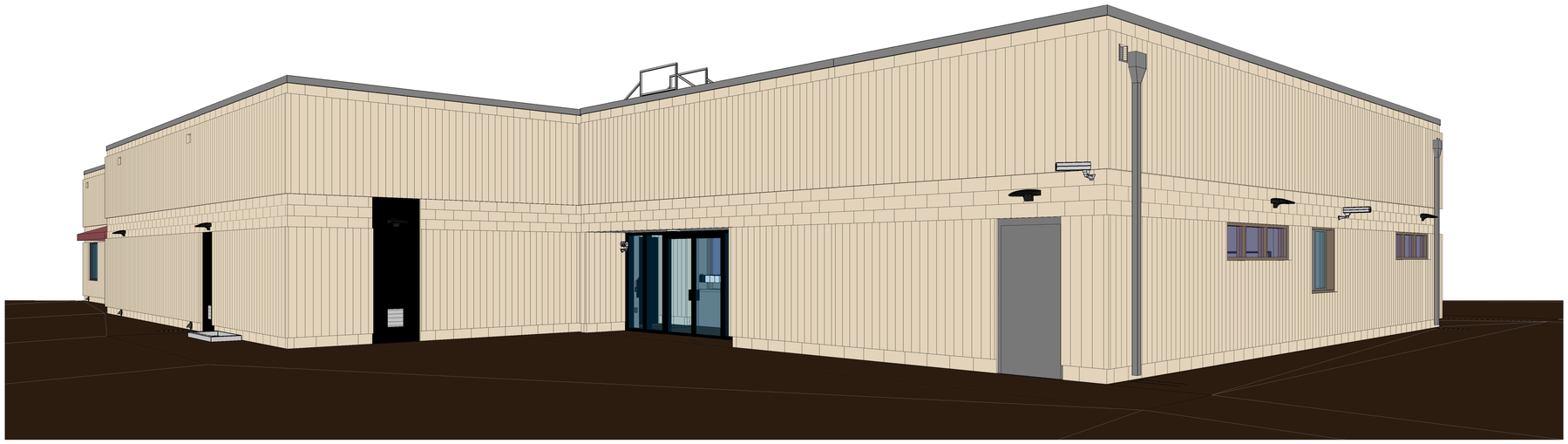
REVIEWED BY:
6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY:
6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 58 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

A-13.3

WW-00007





CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel. (213) 457-2200

LICENSED ARCHITECT
RICHARD D. CHONG
NO. C 8171
REN. 08/30/27
STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @
SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE.
EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

AXONOMETRIC VIEWS

Design by: TIM KING
Date: MAY 2025
Checked by: RICHARD CHONG
Date: MAY 2025
Drawn by: DANIEL ARTEAGA
Date: MAY 2025
Checked by: VALERIA NORATO
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 59 of 126 Sheets
Scale Horiz. AS.SHOWN
Vert. AS.SHOWN

A-14.1

WW-00007

DESIGN CRITERIA

1. APPLICABLE CODE: 2022 CALIFORNIA BUILDING CODE (CBC).
2. REFER TO THE DRAWINGS FOR ADDITIONAL AND SPECIFIC STRUCTURE LOADINGS AND REQUIREMENTS.
3. RISK CATEGORY = III
4. LIVE LOADS:
   - FLOOR LIVE LOAD = 200 PSF
   - ELECTRICAL AREAS = 300 PSF
5. ROOF LOADS:
   - ROOF LIVE LOAD = 20 PSF
6. WIND LOAD:
   - CBC WIND PRESSURE
     - DESIGN WIND SPEED = 102 MPH (ULTIMATE)
       = 80 MPH (ALLOWABLE)
     - EXPOSURE = C
     - DIRECTIONALITY FACTOR K_d = 0.85
     - TOPOGRAPHIC FACTOR K_{zt} = 1.0
     - INTERNAL PRESSURE COEFFICIENT = +/- 0.55 (PARTIALLY ENCLOSED)
7. SEISMIC LOAD:
   - S_S = 2.053
   - S_1 = 0.781
   - S_{DS} = 1.367
   - S_{D1} = 0.884
   - SITE CLASS = D
   - SEISMIC DESIGN CATEGORY = E
   - IMPORTANCE FACTOR, Ie = 1.25
   - COMPONENT IMPORTANCE FACTOR, Ip = 1.0
   - RESPONSE MODIFICATION FACTOR, R = 5.0 FOR SPECIAL REINFORCED MASONRY SHEAR WALLS
   - ANALYSIS PROCEDURE = EQUIVALENT LATERAL FORCE
   - DESIGN BASE SHEAR, V = 0.34*W
   - SEISMIC RESPONSE COEFFICIENT, Cs = 0.34
8. SOIL DESIGN PARAMETERS:
   - ALLOWABLE SOIL BEARING PRESSURE: 2000 PSF
     BEARING PRESSURE MAY BE INCREASED BY 1/3 FOR SEISMIC AND WIND LOAD COMBINATIONS.
   - COEFFICIENT OF FRICTION FACTOR: 0.38, MAY BE COMBINED WITH LATERAL PASSIVE PRESSURE IF PASSIVE PRESSURE IS REDUCED BY 1/3
   - MINIMUM BEARING DEPTH: 1'-6"
   - EQUIVALENT FLUID PRESSURES
     - PASSIVE: 250 PCF

   THE STRUCTURAL DESIGN HEREIN IS BASED ON GEOTECHNICAL RECOMMENDATIONS FROM GEOTECHNICAL INVESTIGATION REPORT TITLED "ENGINEERING RESOURCES OF SOUTHERN CALIFORNIA, INC. PROJECT # 5092-SF" PREPARED BY ARAGON GEOTECHNICAL, INC., DATED OCTOBER 21, 2024.

GENERAL INFORMATION

1. REFER TO CIVIL, ARCHITECTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS FOR NON-STRUCTURAL ITEMS.
2. SEE PROCESS MECHANICAL, BUILDING MECHANICAL, AND ELECTRICAL DRAWINGS FOR PIPE SIZES, PIPE LOCATIONS, PIPE ENCASEMENT, PIPE SLEEVES, CONDUIT OR OTHER ITEMS TO BE EMBEDDED IN OR PASS THROUGH THE CONCRETE. IN GENERAL, EMBEDMENTS AND PENETRATION LESS THAN 12 INCHES IN DIAMETER ARE NOT SHOWN ON STRUCTURAL DRAWINGS. WHERE PIPE PENETRATIONS ARE SHOWN, THE CONTRACTOR IS TO VERIFY SIZE AND LOCATION WITH OTHER DISCIPLINES.
3. NOTES AND DETAILS ON THE DRAWINGS TAKE PRECEDENCE OVER GENERAL NOTES AND TYPICAL DETAILS.
4. STANDARD DETAILS ARE INTENDED TO BE TYPICAL AND APPLY TO SIMILAR SITUATIONS OCCURRING THROUGHOUT THE PROJECT, WHETHER OR NOT THEY ARE INDIVIDUALLY CALLED OUT.
5. ALL DIMENSIONS TAKE PRECEDENCE OVER SCALE SHOWN ON PLANS, SECTIONS, AND DETAILS. DO NOT SCALE DRAWINGS FOR CONSTRUCTION PURPOSES.
6. COORDINATE OPENING DIMENSIONS IN WALLS, SLABS, AND DECKS WITH OTHER DISCIPLINE DRAWINGS.
7. FOR NUMBER, SIZE, ARRANGEMENT, AND/OR LOCATION OF EQUIPMENT PADS SEE OTHER DISCIPLINE DRAWINGS. COORDINATE WITH EQUIPMENT SUPPLIER PRIOR TO PLACING SLABS, WALLS AND FOUNDATIONS.
8. COORDINATE PIPING OPENINGS WITH OTHER DISCIPLINE DRAWINGS.
9. DO NOT CUT STRUCTURAL MEMBERS FOR PIPES, DUCTS, ETC, UNLESS SPECIFICALLY DETAILED OR APPROVED IN WRITING BY THE ENGINEER.
10. SPECIAL INSPECTION AND STRUCTURAL OBSERVATION IS REQUIRED IN ACCORDANCE WITH THE CALIFORNIA BUILDING CODE AND AS INDICATED ON THE SPECIAL INSPECTION AND TESTING DRAWINGS.

FOUNDATIONS

1. SHORE EXCAVATION TO PREVENT SUBSIDENCE OR DAMAGE TO ADJACENT EXISTING STRUCTURES, STREETS, UTILITIES, ETC.
2. BEARING MATERIAL FOR ALL FOUNDATIONS AND SLAB-ON-GRADE FLOORS MUST BE STRUCTURAL FILL MATERIAL PREPARED IN ACCORDANCE WITH THE EARTHWORK SPECIFICATIONS AND AS SHOWN IN THE DRAWINGS.
3. DO NOT PLACE REINFORCING STEEL UNTIL THE GEOTECHNICAL ENGINEER HAS INSPECTED ALL FOUNDATION BEARING SURFACES.
4. PREPARE SUBGRADE IN ACCORDANCE WITH GEOTECHNICAL RECOMMENDATIONS.

FORMWORK AND BRACING

1. THE STRUCTURE IS DESIGNED AS A STABLE UNIT AFTER ALL COMPONENTS ARE IN PLACE. TEMPORARILY BRACE THE STRUCTURE FOR STABILITY UNTIL ALL PERMANENT BRACING SYSTEMS ARE COMPLETE. THE CONTRACTOR SHALL PROVIDE ALL SHORING AND BRACING NECESSARY TO ENSURE THE STABILITY OF ANY AND ALL PARTS OF THE BUILDING DURING CONSTRUCTION. THE CONTRACTOR SHALL RETAIN AT THE CONTRACTOR'S EXPENSE A PROFESSIONAL ENGINEER AS REQUIRED TO DETERMINE THE ADEQUACY OF ALL SHORING AND BRACING DURING CONSTRUCTION.

CONCRETE REINFORCING

1. REINFORCING STEEL:
   - TYPICAL: ASTM A615, GRADE 60
   - WELDED: ASTM A706, GRADE 60
2. CLEARANCE FOR REINFORCEMENT BARS, UNLESS SHOWN OTHERWISE, SHALL BE:
   - UNFORMED SURFACES IN CONTACT WITH EARTH 3"
   - INTERIOR, DRY, FINISHED, HUMIDITY CONTROLLED AREAS:
     - WALLS AND SLABS 2"
   - ALL OTHER CONCRETE SURFACES: 2"
3. FABRICATE AND PLACE OF REINFORCING STEEL IN ACCORDANCE WITH CRSI MSP-1 "MANUAL OF STANDARD PRACTICE" AND ACI 301 "SPECIFICATIONS FOR STRUCTURAL, CONCRETE FOR BUILDING".
4. POSITION SINGLE MAT REINFORCING AT MID-DEPTH FOR SLABS-ON-GRADE, UNLESS NOTED OTHERWISE.
5. PROVIDE DIAGONAL BARS AT CORNERS OF WALL, FLOOR, AND ROOF OPENINGS AND REENTRANT CORNERS OF FLOORS AND SLABS. DIAGONAL BARS TO BE 2-#5 BARS UNLESS NOTED OTHERWISE.
6. SATISFY THE REQUIREMENTS SPECIFIED IN ACI 318 FOR REINFORCEMENT BENDS AND LAPS, UNLESS OTHERWISE NOTED.
7. AT LOCATIONS WHERE MULTIPLE ELECTRICAL CONDUIT OR SMALL PIPING (6" DIAMETER OR LESS) IN CLOSE PROXIMITY PENETRATE CONCRETE SLABS OR WALLS, SPACE PIPING/CONDUIT TO OCCUR BETWEEN TYPICAL REINFORCING WITHOUT CUTTING BARS, AND MAINTAINING MIN 2" CLEARANCE. IF REBAR MUST BE CUT, PROVIDE ADDITIONAL REBAR AROUND CONDUIT/PIPING GROUP PER TYP. DETAIL. DO NOT ROUTE LARGE NUMBERS OF CONDUIT/PIPING THROUGH LOAD BEARING FOUNDATIONS OR FOOTINGS WITHOUT WRITTEN APPROVAL FROM THE ENGINEER.
8. FOR SPACING REQUIREMENTS OF CONDUITS IN WALLS AND SLABS, REFER TO PIPING AND CONDUIT IN OR THROUGH SLAB OR WALL TYPICAL DETAIL.

CONCRETE

1. REINFORCED CONCRETE SHALL CONFORM TO ACI 301 AND 318.
2. 28-DAY CAST-IN-PLACE CONCRETE STRENGTHS:
   - STRUCTURAL CONCRETE FOUNDATION MATS AND SLABS, WALLS AND FOOTINGS: 4000 PSI
   - CONCRETE PAVEMENT, CURBS, SIDEWALKS, AND MISC SITE CONCRETE
     CONCRETE FILL, ELECTRICAL RACEWAY ENCASEMENT, CONDUIT AND PIPE ENCASEMENTS NOT INTEGRAL WITH FOUNDATIONS: 2,500 PSI
3. MAKE CONSTRUCTION JOINTS AT LOCATIONS SHOWN ON THE DRAWINGS OR AS APPROVED BY THE ENGINEER OF RECORD. ADDITIONAL OR RELOCATION OF CONSTRUCTION JOINTS SHALL BE SUBMITTED FOR APPROVAL BY THE ENGINEER.
4. ROUGHEN AND CLEAN CONSTRUCTION JOINTS IN WALLS AND SLABS AS SPECIFIED PRIOR TO PLACING ADJACENT CONCRETE.
5. COORIDNATE PLACEMENT OF OPENINGS, CURBS, DOWELS, SLEEVES, CONDUITS, BOLTS AND INSERTS PRIOR TO PLACEMENT OF CONCRETE.
6. DO NOT EMBED ALUMINUM CONDUIT OR PRODUCTS CONTAINING ALUMINUM OR ANY OTHER MATERIAL INJURIOUS TO THE CONCRETE IN THE CONCRETE. COAT ALUMINUM IN CONTACT WITH CONCRETE WITH A BITUMINOUS COATING.
7. PROVIDE 3/4-IN CHAMFER AT ALL EXPOSED CORNERS OF CONCRETE, UON.

MASONRY

1. FULLY GROUT MASONRY WALLS. PROVIDE MASONRY WITH A MINIMUM COMPRESSIVE STRENGTH (f'm) OF 2,000 PSI AT 28 DAYS.
2. PROVIDE MEDIUM OR NORMAL WEIGHT BLOCK IN ACCORDANCE WITH ASTM SPECIFICATION C90 WITH A MINIMUM NET AREA COMPRESSIVE STRENGTH OF 2,000 PSI.
3. PROVIDE MORTAR THAT CONFORMS TO ASTM C270, TYPE S WITH MINIMUM COMPRESSIVE STRENGTH OF 2,000 PSI AT 28 DAYS.
4. PROVIDE GROUT THAT CONFORMS TO ASTM C476 AND CONTAIN A MIXTURE OF CEMENT, SAND, PEA GRAVEL AND WATER WHICH WILL COMPLETELY FILL ALL VOIDS IN THE WALL. PROVIDE GROUT WITH MINIMUM COMPRESSIVE STRENGTH OF 2,500 PSI AT 28 DAYS.
5. PROVIDE AGGREGATES FOR MORTAR AND GROUT OF NATURAL SAND AND ROCK COMPLYING WITH ASTM C144 AND C404.
6. PROVIDE RUNNING BOND MASONRY UNIT PATTERN UNLESS NOTED OTHERWISE.
7. DOWEL VERTICAL WALL REINFORCEMENT TO THE FOUNDATION WITH THE SAME SIZE, SPACING, AND NUMBER OF BARS AS SHOWN IN THE WALLS UNLESS NOTED OTHERWISE.
8. PROVIDE ONE INCH MINIMUM GROUT COVER ON BOLTS.
9. PLACE HORIZONTAL REINFORCING IN BOND BEAM UNITS.
10. DO NOT PLACE PIPES, CONDUITS, OR DUCTS IN MASONRY WALLS UNLESS SPECIFICALLY NOTED OR DETAILED IN THE DRAWINGS.

CONCRETE AND MASONRY ANCHORS

1. LOCATE EXISTING REINFORCING USING NON-DESTRUCTIVE METHODS PRIOR TO DRILLING HOLES FOR ADHESIVE AND EXPANSION ANCHORS. ADJUST SPACING OF ANCHORS TO MISS REINFORCING, HOWEVER, TOTAL NUMBER OF ANCHORS PROVIDED MUST EQUAL NUMBER SHOWN ON DRAWINGS.
2. SIZE ALL DRILLED HOLES ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
3. SEE POST-INSTALLED CONCRETE AND MASONRY ANCHORS SPECIFICATION FOR ADDITIONAL INFORMATION AND REQUIREMENTS. BASIS OF DESIGN FOR ANCHORS ARE AS FOLLOWS:

   HILTI HIT-RE 500 V3 (ICC EVALUATION REPORT 3814) ADHESIVE FOR DOWELS AND ANCHORS IN CONCRETE

   HILTI HIT-HY 270 (ICC EVALUATION REPORT 4143) ADHESIVE FOR DOWELS AND ANCHORS IN MASONRY

STEEL JOIST NOTES

1. JOIST, BRACE AND BRIDGING MUST BE DESIGNED AND SEALED BY A PROFESSIONAL CIVIL OR STRUCTURAL ENGINEER REGISTERED IN THE STATE OF CALIFORNIA AND SUBMITTED TO THE ENGINEER FOR REVIEW. JOIST MUST BE DESIGNED TO MEET ALL APPLICABLE UNIFORM, AXIAL AND CONCENTRATED LOADS LISTED IN THE DRAWINGS AND BELOW.
   - A. DEAD LOAD: 25 PSF
   - B. REDUCED DEAD LOAD FOR UPLIFT: 15 PSF
   - C. ROOF LIVE LOAD: 20 PSF
   - D. UNLESSS OTHERWISE NOTED, MINIMUM 700 LB POINT LOAD OCCURRING ANYWHERE WITHIN THE SPAN AT THE TOP OR BOTTOM CHORD LOAD SPACING 3'-0" MINIMUM. COORDINATE WITH CONTRACTOR AND MANUFACTURER ANY EQUIPMENT POINT LOADS GREATER THEN 700 LBS.
   - E. WIND: SEE DRAWINGS
   - F. SEISMIC: SEE DRAWINGS
2. STEEL JOISTS SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH SJI "STANDARD SPECIFICATIONS LOAD TABLES AND WEIGHT TABLES FOR STEEL JOISTS AND JOIST GIRDERS".
3. BRIDGING AND CROSS BRACING SHALL BE DESIGNED AND DETAILED PER DELEGATED DESIGNER RECOMMENDATION. JOISTS SHALL NOT EXPERIENCE DESIGN LOADS UNTIL BRIDGING AND STRUCTURAL DECKING HAS BEEN INSTALLED.
4. SUGGESTED STEEL JOIST DEPTHS AND TYPES ARE LISTED ON PLANS, I.E., 20K. THE STEEL JOIST SHALL BE DESIGNED TO MEET OR EXCEED THE MAXIMUM DESIGN LOADS PROVIDED IN THE DRAWINGS. ANY CLARIFICATION NEEDED FOR LOAD REQUIREMENTS SHOULD BE DISCUSSED WITH THE ENGINEER OF RECORD PRIOR TO FABRICATION.
5. ADDITIONAL WEB MEMBERS SHALL BE PROVIDED IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS AT CONCENTRATED LOADS APPLIED TO STEEL JOISTS.

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REGISTERED PROFESSIONAL ENGINEER
ALAM HARRY HAHN
C 82421
CIVIL
STATE OF CALIFORNIA
5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

STRUCTURAL
GENERAL NOTES 1

Design by: M. ARIEF
Date: MAY 2025
Checked by: A. BECKWITH
Date: MAY 2025
Drawn by: G. GANESH
Date: MAY 2025
Checked by: A. HAHN
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 60 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

S-1

WW-00007

METAL DECKING

1. COMPLY WITH THE REQUIREMENTS OF THE STEEL DECK INSTITUTE (SDI) FOR METAL DECKS. THE TYPE AND GAUGE MUST BE AS INDICATED ON THE DRAWINGS AND MUST BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND PUBLISHED ICC REPORT.
2. FORM ROOF METAL DECKING AND ACCESSORIES FROM STEEL SHEETS CONFORMING TO ASTM A653, SS DESIGNATION GRADE 80 OR HIGHER SPECIFICATIONS.
3. GALVANIZE DECK IN ACCORDANCE WITH ASTM A653 COMMERCIAL COATING CLASS G90.

WELDING

1. CONFORM TO AWS D1.1 LATEST EDITION AS SPECIFIED FOR STEEL WELDING.
2. REPAIR WELDS FOUND DEFECTIVE IN ACCORDANCE WITH AWS D1.1, 5.26.
3. USE COMPLETE JOINT PENETRATION (CJP) FOR BUTT JOINT WELDS UNLESS NOTED OTHERWISE .
4. CONTROL THE WELD SEQUENCE AND TECHNIQUE IN ORDER TO MINIMIZE SHRINKAGE, STRESSES AND DISTORTION.
5. THE MINIMUM STRENGTH FOR ELECTRODES FILLER MATERIAL IS 70 KSI.
6. WELDING OF METAL DECK AND LIGHT GAUGE METAL FRAMING MUST BE DONE BY CERTIFIED LIGHT GAUGE WELDERS IN ACCORDANCE WITH AWS SPECIFICATIONS FOR WELDING SHEET STEEL IN STRUCTURES AWS D1.3.
7. UNLESS A LARGER SIZE FILLET WELD IS INDICATED, PROVIDE MINIMUM SIZE WELD PER AISC SPECIFICATION, SECTION J2 AND TABLE J2.4.
8. WELD LENGTHS INDICATED ON PLANS ARE THE MINIMUM NET EFFECTIVE LENGTH REQUIRED. USE FULL LENGTH OF JOINT WHERE LENGTH OF WELD IS NOT SPECIFIED.

STRUCTURAL STEEL AND METAL FABRICATIONS

1. STRUCTURAL STEEL SHALL CONFORM TO THE FOLLOWING:

W - SHAPES	ASTM A992
MISCELLANEOUS SHAPES INCLUDING ANGLES, CHANNELS, PLATES, ETC.	ASTM A36
SQUARE OR RECTANGULAR HOLLOW STRUCTURAL SECTIONS	ASTM A500, GRADE B
STEEL PIPE	ASTM A501 OR A53, GRADE B

2. STRUCTURAL ALUMINUM:

ALLOY	6061-T6, UON
EXTRUSIONS	ASTM B221 OR B308
SHEET	ASTM B209
BOLTS, NUTS AND WASHERS	STAINLESS-STEEL
WELDING FILLER MATERIAL	5356

3. FABRICATE AND ERECT STRUCTURAL STEEL IN CONFORMANCE WITH THE AISC MANUAL OF STEEL CONSTRUCTION, CURRENT EDITION, AND CURRENT OSHA STANDARDS.
4. USE HIGH STRENGTH BOLTS FOR BOLTS AND CONFORM TO THE FOLLOWING ASTM STANDARDS EXCEPT WHERE SPECIFICALLY INDICATED OTHERWISE:

UNLESS SHOWN OTHERWISE	F3125, GRADE A325
MACHINE BOLTS (MB)	A307
STAINLESS STEEL	F593, TYPE 316
GALVANIZED STEEL	A153
ANCHOR BOLTS	F1554 GRADE 36

5. CLEAN ITEMS TO BE EMBEDDED IN CONCRETE OF OIL, DIRT AND PAINT.
6. NO HOLES, OTHER THAN THOSE SPECIFICALLY DETAILED, ARE ALLOWED THROUGH STRUCTURAL STEEL MEMBERS. NO CUTTING OR BURNING OF STRUCTURAL STEEL IS PERMITTED WITHOUT THE APPROVAL OF THE STRUCTURAL ENGINEER.
7. HOT-DIPPED GALVANIZE PER ASTM A123, A153, AND A385 AFTER FABRICATION OF ALL STRUCTURAL STEEL AND CONNECTORS EXPOSED TO WEATHER OR WHERE INDICATED ON DRAWINGS. REPAIR PER ASTM A780.

DELEGATED-DESIGN SUBMITTALS

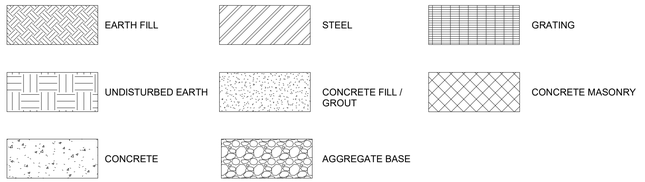
1. THE FOLLOWING STRUCTURAL PORTIONS OF THE PROJECT ARE DELEGATED-DESIGN ITEMS AND HAVE NOT BEEN DESIGNED BY THE ENGINEER OF RECORD:
   a. METAL FABRICATIONS (GRATED STAIRS, STEP OVERS, PLATFORMS, SUPPORTS, GRATING, HANDRAILS, GUARDRAILS, SCREEN WALLS AND ASSOCIATED ANCHORAGE).
   b. EQUIPMENT SUPPORTS/CURBS AND/OR ANCHORAGE.
   c. PIPE AND DUCT SUPPORTS AND ANCHORAGE.
   d. STEEL JOISTS.
2. SUBMIT EACH DELEGATED-DESIGN ITEM, SHOP DRAWING, AND CALCULATION TO THE ENGINEER FOR REVIEW AND ACCEPTANCE DURING THE CONSTRUCTION PHASE OF THE PROJECT. DO NOT FABRICATE, ERECT, OR INSTALL DELEGATED DESIGN ITEMS (INCLUDING ANY DEFERRED SUBMITTALS) UNTIL DOCUMENTS HAVE BEEN ACCEPTED BY THE ENGINEER.
3. STAMP AND SEAL DELEGATED-DESIGN SUBMITTAL DOCUMENTS BY A CIVIL OR STRUCTURAL ENGINEER REGISTERED IN THE STATE OF CALIFORNIA.

STRUCTURAL LEGEND AND SYMBOLS

(E) INDICATES EQUIPMENT PAD PER STANDARD DETAIL. COORDINATE SIZE WITH EQUIPMENT REQUIREMENTS.

GRATING SPAN DIRECTION

FLOOR DRAIN / FLOOR SINK



ABBREVIATION NOTES

1. FOR ABBREVIATIONS NOT LISTED, SEE ASME Y14.38 "ABBREVIATIONS AND ACRONYMS" PUBLICATION AS DISTRIBUTED BY THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME).
2. ABBREVIATIONS AND DESIGNATIONS FOR STEEL MEMBERS MAY BE FOUND IN THE CURRENT MANUAL OF STEEL CONSTRUCTION BY AISC.
3. ABBREVIATIONS OF TECHNICAL SOCIETIES AND TRADE ASSOCIATIONS MAY BE FOUND IN THE SPECIFICATIONS.
4. WELDING SYMBOLS AND ABBREVIATIONS MAY BE FOUND IN AWS 2.4.

ABBREVIATIONS

&	AND
@	AT
∅	DIAMETER
#	NUMBER
AB	AGGREGATE BASE
ABV	ABOVE
ADDL	ADDITIONAL
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
AL	ALUMINUM
ALT	ALTERNATE (ING)
APPROX	APPROXIMATE (LY)
ARCH	ARCHITECT (URAL) (URE)
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
AWS	AMERICAN WELDING SOCIETY
BGS	BELOW GROUND SURFACE
B/	BOTTOM OF
BOT	BOTTOM
BRG	BEARING
CIP	CAST-IN-PLACE
CJ	CONSTRUCTION JOINT
CL	CENTERLINE
CLR	CLEAR
CLSM	CONTROLLED LOW-STRENGTH MATERIAL
CMU	CONCRETE MASONRY UNITS
CONC	CONCRETE
CONT	CONTINUOUS
CRS	COURSE (S)
CTR	CENTER (ED)
D	DIAMETER OF THE BEND
d	PENNEY
dB	BAR DIAMETER
DET	DETAIL
DIA	DIAMETER
DIAG	DIAGONAL
DWG	DRAWING
DWL	DOWEL
EA	EACH
EF	EACH FACE
EL	ELEVATION
ELEC	ELECTRIC (AL)
EMBED	EMBEDMENT
EQ	EQUAL (LY)
EQPT	EQUIPMENT
ES	EACH SIDE
EW	EACH WAY
EXP	EXPANSION
EXST	EXISTING
EXT	EXTERIOR
f'c	CONCRETE COMPRESSION STRESS
f'm	MASONRY PRISM STRESS
FAB	FABRICATE (OR) (ED)
FD	FLOOR DRAIN
FDN	FOUNDATION
FG	FINISHED GRADE
FIN	FINISH (ED)
FL	FLOOR
FLG	FLANGE (ED)
FRP	FIBERGLASS REINFORCED PLASTIC
FT	FEET/FOOT
FTG	FOOTING/FITTING
GA	GAGE
GALV	HOT-DIPPED GALVANIZED
GR	GRADE
GRTG	GRATING
HORIZ	HORIZONTAL
HP	HIGH POINT
HR	HANDRAIL
HVAC	HEATING, VENTILATING AND AIR CONDITIONING
IAW	IN ACCORDANCE WITH
ID	INSIDE DIAMETER
IF	INSIDE FACE
IN	INCH
INT	INTERIOR
INV	INVERT
JT	JOINT
KSI	KIPS PER SQUARE INCH
L	ANGLE DESIGNATION OR LENGTH
Ld	DEVELOPMENT LENGTH
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LNTL	LINTEL
LOC	LOCATION/LOCATED
LONG	LONGITUDINAL
LP	LOW POINT
LT	LEFT
MAS	MASONRY
MATL	MATERIAL
MAX	MAXIMUM
MB	MACHINE BOLTS
MCJ	MASONRY CONTROL JOINT
MECH	MECHANICAL
MFD	MANUFACTURED
MFG	MANUFACTURING
MFR	MANUFACTURER
MIN	MINIMUM
MISC	MISCELLANEOUS
MO	MASONRY OPENING
MTL	METAL
(N)	NEW
NF	NEAR FACE
NS	NON-SHRINK
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTSIDE DIAMETER
OF	OUTSIDE FACE
OPNG	OPENING
OPP	OPPOSITE
OPP HD	OPPOSITE HAND
OPT	OPTIONAL
PCF	POUNDS PER CUBIC FOOT
PCJ	PARTIAL CONTRACTION JOINT
PJF	PREMOLDED JOINT FILLER
PL	PLATE
PRCST	PRECAST
PREFAB	PRE-FABRICATED
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PVMT	PAVEMENT
R	RISER (S)
REF	REFERENCE/REFER
REINF	REINFORCE (D) (ING) (MENT)
REQD	REQUIRED
REV	REVISION
RLG	RAILING
RO	ROUGH OPENING
RT	RIGHT
SCHED	SCHEDULE
SECT	SECTION
SIM	SIMILAR
SP	SPACE (S) (D)
SPEC	SPECIFICATION/SPECIFIED
SQ	SQUARE
SS / SST	STAINLESS STEEL
STD	STANDARD
STIF	STIFFENER
STIR	STIRRUP (S)
SYM	SYMMETRICAL
T	TREAD (S)
T&B	TOP AND BOTTOM
TF	TOP FACE
THD	THREADED
THK	THICK (NESS)
T/	TOP OF
TRNSV	TRANSVERSE
(TYP)	TYPICAL
UNO	UNLESS NOTED OTHERWISE
UON	UNLESS OTHERWISE NOTED
VB	VAPOR BARRIER
VERT	VERTICAL
VIF	VERIFY IN FIELD
W	WIDE FLANGE
W/	WITH
W/O	WITHOUT
WP	WORKING POINT
WS	WATERSTOP
WWF	WELDED WIRE FABRIC

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REGISTERED PROFESSIONAL ENGINEER — ALAN HARRY HAHN — C 82421 — CIVIL — STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

STRUCTURAL
GENERAL NOTES 2

Design by: M. ARIEF
Date: MAY 2025
Checked by: A. BECKWITH
Date: MAY 2025
Drawn by: G. GANESH
Date: MAY 2025
Checked by: A. HAHN
Date: MAY 2025

REVIEWED BY: _____ 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: _____ 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 61 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

S-2

WW-00007

NOTES:

1. THIS DRAWING IS PROVIDED TO OUTLINE THE MINIMUM LEVEL OF SPECIAL INSPECTIONS DURING CONSTRUCTION TO ENSURE CONFORMANCE TO THE REQUIREMENTS OF THE CONTRACT DOCUMENTS. A STATEMENT OF SPECIAL INSPECTIONS WILL BE PREPARED BY A REGISTERED DESIGN PROFESSIONAL AND SUBMITTED TO THE DESIGN-BUILD ENTITY.
2. SPECIAL INSPECTIONS WILL BE CONDUCTED IN ACCORDANCE WITH THE REQUIREMENTS SET FORTH IN CHAPTER 17 OF THE CALIFORNIA BUILDING CODE (CBC).
3. IN ACCORDANCE WITH THE REQUIREMENTS OF CHAPTER 17 OF THE CALIFORNIA BUILDING CODE, THE CONTRACTOR WILL PROVIDE A SPECIAL INSPECTOR (AN APPROVED AGENCY OR AGENCIES, INDEPENDENT FROM THE CONTRACTOR AND EMPLOYING QUALIFIED PERSONNEL) TO PERFORM SPECIAL INSPECTIONS IDENTIFIED IN THE STATEMENT OF SPECIAL INSPECTIONS. THE APPROVED AGENCY WILL FURNISH INSPECTION REPORTS TO THE ENGINEER.
4. SPECIAL INSPECTIONS DO NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY FOR QUALITY CONTROL OF THE WORK OR FOR CONFORMANCE TO THE REQUIREMENTS OF THE CONTRACT DOCUMENTS. DETECTION OF, OR FAILURE TO DETECT, DEFECTS IN THE WORK DO NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY TO CORRECT ALL DEFECTS IN THE WORK, WHETHER DETECTED OR NOT, AND OF RESPONSIBILITY FOR CONFORMANCE TO THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.
5. REMOVE AND REPLACE, OR REPAIR, DEFECTS IN THE WORK AND WORK NOT IN CONFORMANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS AT NO ADDITIONAL COST TO THE OWNER. CONTRACTOR MUST BEAR THE COSTS FOR THE INSPECTION OF ANY REPLACED OR REPAIRED PORTIONS OF THE WORK.
6. COOPERATE WITH SPECIAL INSPECTIONS BY PROVIDING SUFFICIENT NOTICE FOR THE SCHEDULING OF PERSONNEL AND BY ALLOWING FREE AND SAFE ACCESS TO THE WORK FOR OBSERVATION, VERIFICATION, SAMPLING AND INSPECTION. PROVIDE AND PERMIT THE USE OF LADDERS, SCAFFOLDING, INCIDENTAL EQUIPMENT, AND SAFETY EQUIPMENT AS MAY BE REQUIRED TO CONDUCT SPECIAL INSPECTIONS. ALL SUCH PROVISIONS FOR FREE AND SAFE ACCESS AND EQUIPMENT MUST BE SAFE, IN GOOD WORKING CONDITION, AND ERECTED, MAINTAINED, AND HANDLED BY QUALIFIED PERSONNEL.
7. SPECIAL INSPECTIONS DO NOT APPLY TO CONTRACTOR'S EQUIPMENT, TEMPORARY STRUCTURES USED FOR CONSTRUCTION, MEANS AND METHODS OF CONSTRUCTION, OR SITE SAFETY. CONTRACTOR IS RESPONSIBLE FOR ADEQUACY AND SAFETY OF EQUIPMENT, TEMPORARY STRUCTURES USED FOR CONSTRUCTION, MEANS AND METHODS OF CONSTRUCTION, AND SITE SAFETY.
8. IN ADDITION, PROVIDE STRUCTURAL OBSERVATION IN ACCORDANCE WITH CHAPTER 17 OF THE CBC.

TABLE 1 - REQUIRED SPECIAL INSPECTIONS AND TESTS OF SOIL (CBC, TABLE 1705.6)

VERIFICATION AND INSPECTION	CBC REFERENCE	INSPECTION FREQUENCY		REFERENCE STANDARD
		CONTINUOUS	PERIODIC	
VERIFY MATERIALS BELOW SHALLOW FOUNDATIONS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY	1705.6		X	CONTRACT DOCUMENTS AND GEOTECHNICAL REPORT
VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL			X	
PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIALS			X	
DURING FILL PLACEMENT, VERIFY USE OF PROPER MATERIALS AND PROCEDURES IN ACCORDANCE WITH THE PROVISIONS OF THE APPROVED GEOTECHNICAL REPORT. VERIFY DENSITIES AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF COMPACTED FILL.		X		
PRIOR TO PLACEMENT OF COMPACTED FILL, INSPECT SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY			X	

TABLE 2 - REQUIRED SPECIAL INSPECTIONS AND TESTS OF CONCRETE CONSTRUCTION (CBC, TABLE 1705.3)

VERIFICATION AND INSPECTION	CBC REFERENCE	INSPECTION FREQUENCY		REFERENCE STANDARD
		CONTINUOUS	PERIODIC	
INSPECT REINFORCEMENT AND VERIFY PLACEMENT	1705.3		X	ACI 318: CH 20, 25.2, 25.3, 26.6.1-26.6.3
REINFORCING BAR WELDING: a. VERIFY WELDABILITY OF REINFORCING BARS OTHER THAN ASTM A 706	1705.3		X	AWS D1.4 ACI 318: 26.6.4
b. INSPECT SINGLE PASS FILLET WELDS MAX 5/16"			X	
c. INSPECT ALL OTHER WELDS		X		
INSPECT ANCHORS CAST IN CONCRETE	1705.3		X	ACI 318: 17.8.2
INSPECT ANCHORS POST-INSTALLED IN HARDENED CONCRETE MEMBERS: a. ADHESIVE ANCHORS INSTALLED IN HORIZONTALLY OR UPWARDLY INCLINED ORIENTATIONS TO RESIST SUSTAINED TENSION LOADS	1705.3	X		ACI 318: 17.8.2.4 ICC OR IAPMO TEST REPORT FOR SPECIFIC ANCHORS
b. MECHANICAL ANCHORS AND ADHESIVE ANCHORS NOT DEFINED IN a		X		ACI 318: 17.8.2 ICC OR IAPMO TEST REPORT FOR SPECIFIC ANCHORS
VERIFYING USE OF REQUIRED DESIGN MIX	1705.3 1904.1 1904.2		X	ACI 318: CH 19, 26.4.3, 26.4.4
PRIOR TO CONCRETE PLACEMENT, FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMPERATURE OF THE CONCRETE	1705.3	X		ACI 318: 26.5, 26.12 ASTM C172 ASTM C31
INSPECT CONCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUES	1705.3	X		ACI 318: 26.5
VERIFY MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES	1705.3		X	ACI 318: 26.5.3-26.5.5
INSPECT FORMWORK FOR SHAPE, LOCATION AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED	1705.3		X	ACI 318: 26.11.1.2(b)

TABLE 3 - REQUIRED SPECIAL INSPECTIONS AND TESTS OF STEEL CONSTRUCTION OTHER THAN STRUCTURAL STEEL (PER CBC 1705.2.2)

VERIFICATION AND INSPECTION	CBC REFERENCE	INSPECTION FREQUENCY		REFERENCE STANDARD
		CONTINUOUS	PERIODIC	
MATERIAL VERIFICATION OF COLD-FORMED STEEL DECK:				
a. IDENTIFICATION MARKINGS TO CONFORM TO ASTM STANDARDS SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS	1705.2.2		X	APPLICABLE ASTM MATERIAL STANDARDS
b. MANUFACTURER'S CERTIFIED MILL TEST REPORTS			X	
INSPECTION OF WELDING: a. COLD-FORMED STEEL DECK	1705.2.2			
1) ROOF DECK WELDS			X	AWS D1.3

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5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028
STRUCTURAL
SPECIAL INSPECTION 1

Design by: M. ARIEF
Date: MAY 2025
Checked by: A. BECKWITH
Date: MAY 2025
Drawn by: G. GANESH
Date: MAY 2025
Checked by: A. HAHN
Date: MAY 2025

REVIEWED BY:
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 — 6/11/2025 DATE
APPROVED BY:
Goutam K. Dobey, City Engineer, RCE 75646 — 6/11/2025 DATE

Sheet 62 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

S-3

WW-00007

TABLE 4 - REQUIRED SPECIAL INSPECTIONS AND TESTS OF STRUCTURAL STEEL CONSTRUCTION (AISC 360, PER CBC 1705.2)

VERIFICATION AND INSPECTION	CBC REFERENCE	INSPECTION FREQUENCY		REFERENCE STANDARD
		CONTINUOUS	PERIODIC	
MATERIAL VERIFICATION OF HIGH-STRENGTH BOLTS, NUTS AND WASHERS				
a. IDENTIFICATION MARKINGS TO CONFORM TO ASTM STANDARDS SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS	1705.2		X	AISC 360, SECTION A3.3 AND APPLICABLE ASTM MATERIAL STANDARDS
b. MANUFACTURER'S CERTIFICATE OF COMPLIANCE REQUIRED			X	
INSPECTION OF HIGH-STRENGTH BOLTING:				
a. SNUG-TIGHT JOINTS	1705.2		X	AISC 360, SECTION A3.1
MATERIAL VERIFICATION OF STRUCTURAL STEEL:				
a. IDENTIFICATION MARKINGS TO CONFORM TO AISC 360	1705.2		X	AISC 360, SECTION M5.5
b. MANUFACTURER'S CERTIFIED MILL TEST REPORTS			X	
MATERIAL VERIFICATION OF WELD FILLER MATERIALS:				
a. IDENTIFICATION MARKINGS TO CONFORM TO AWS SPECIFICATION IN THE APPROVED CONSTRUCTION DOCUMENTS	1705.2		X	AISC 360, SECTION A3.5 AND APPLICABLE AWS A5 DOCUMENTS
b. MANUFACTURER'S CERTIFICATE OF COMPLIANCE REQUIRED			X	
INSPECTION OF WELDING:				
a. COMPLETE AND PARTIAL PENETRATION GROOVE WELDS	1705.2 1704.3.1	X		AWS D1.1
b. MULTIPASS FILLET WELDS		X		
c. SINGLE-PASS FILLET WELDS >5/16"		X		
d. PLUG AND SLOT WELDS		X		
e. SINGLE-PASS FILLET WELDS < OR = 5/16"			X	

TABLE 5 - REQUIRED SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE (CBC, SECTION 1705.13)

SYSTEM OR MATERIAL	CBC REFERENCE	INSPECTION FREQUENCY		REFERENCE STANDARD
		CONTINUOUS	PERIODIC	
STRUCTURAL STEEL IN STRUCTURES	1705.13 1705.13.1			QUALITY ASSURANCE REQUIREMENTS OF AISC 341
COLD-FORMED STEEL IN STRUCTURES				
a. WELDING OF ELEMENTS OF THE SEISMIC FORCE RESISTING SYSTEM	1705.13		X	
b. SCREW ATTACHMENT, BOLTING, ANCHORING AND OTHER FASTENING OF COMPONENTS WITHIN THE SEISMIC FORCE RESISTING SYSTEM	1705.13.3		X	
MECHANICAL AND ELECTRICAL COMPONENTS	1705.13 1705.13.6		X	
a. DURING ANCHORAGE OF ELECTRICAL EQUIPMENT FOR EMERGENCY OR STANDBY POWER SYSTEMS	1705.13 1705.13.6.1		X	
b. DURING ANCHORAGE OF OTHER ELECTRICAL EQUIPMENT	1705.13 1705.13.6.2		X	
c. DURING INSTALLATION AND ANCHORAGE OF PIPING SYSTEMS INTENDED TO CARRY HAZARDOUS MATERIALS AND THEIR ASSOCIATED MECHANICAL UNITS	1705.13 1705.13.6.3		X	
d. DURING THE INSTALLATION AND ANCHORAGE OF VIBRATION ISOLATION SYSTEMS WHERE THE APPROVED CONSTRUCTION DOCUMENTS REQUIRE A NOMINAL CLEARANCE OF 1/4 INCH (6.4MM) OR LESS BETWEEN THE EQUIPMENT SUPPORT FRAME AND RESTRAINT	1705.13 1705.13.6.5		X	

TABLE 6 - LEVEL 3 REQUIRED SPECIAL INSPECTIONS AND TESTS OF MASONRY CONSTRUCTION (TMS 602, PER CBC 1705.4)

VERIFICATION AND INSPECTION	CBC REFERENCE	INSPECTION FREQUENCY		REFERENCE STANDARD
		CONTINUOUS	PERIODIC	
VERIFICATION OF f'_m PRIOR TO CONSTRUCTION AND FOR EVERY 5000 SQ.FT DURING CONSTRUCTION	1705.4		X	TMS 602 ARTICLE 1.4B
VERIFICATION OF PROPORTIONS OF MATERIALS IN PREMIXED OR PREBLENDED MORTAR AND GROUT OTHER THAN SELF CONSOLIDATING GROUT AS DELIVERED TO PROJECT SITE			X	TMS 602 ARTICLE 1.4B
VERIFICATION OF SLUMP FLOW AND VSI AS DELIVERED TO THE SITE FOR SELF-CONSOLIDATING GROUT		X		TMS 602 ARTICLE 1.5,1.6.3
VERIFY COMPLIANCE WITH REQUIRED INSPECTION PROVISIONS OF THE CONSTRUCTION DOCUMENTS AND THE APPROVED SUBMITTALS			X	TMS 602 ARTICLE 1.5
VERIFY THE FOLLOWING TO ENSURE COMPLIANCE:				
a. PROPORTIONS OF SITE-MIXED MORTAR AND GROUT			X	TMS 602 ARTICLE 2.1, 2.6A, 2.6C
b. GRADE, TYPE AND SIZE OF REINFORCEMENT AND ANCHORAGES			X	TMS 402 SECTION 6.1 TMS 602 ARTICLE 3.4, 3.6A
c. PLACEMENT OF MASONRY UNITS AND CONSTRUCTION OF MORTAR JOINTS			X	TMS 602 ARTICLE 3.3B
d. PLACEMENT OF REINFORCEMENT, CONNECTORS AND ANCHORAGES		X		TMS 402 SECTIONS 6.1, 6.3.1, 6.3.6, 6.3.7 TMS 602 ARTICLE 3.2E, 3.4
e. GROUT SPACE PRIOR TO GROUTING		X		TMS 602 ARTICLE 3.2D, 3.2F
f. PLACEMENT OF GROUT		X		TMS 602 ARTICLE 3.5, 3.6C
g. SIZE AND LOCATION OF STRUCTURAL ELEMENTS			X	TMS 602 ARTICLE 3.3F
h. TYPE, SIZE AND LOCATION OF ANCHORS, INCLUDING OTHER DETAILS OF ANCHORAGE OF MASONRY TO STRUCTURAL MEMBERS, FRAMES OR OTHER CONSTRUCTION		X		TMS 402, SECTIONS 1.2.1(e), 6.2.1, 6.3.1
i. WELDING OF REINFORCING BARS (WHEN WELDING IS SPECIFIED OR APPROVED IN WRITING)		X		TMS 402, SECTIONS 6.1.6.1.2
j. PREPARATION, CONSTRUCTION AND PROTECTION OF MASONRY DURING COLD WEATHER (TEMPERATURE BELOW 40°F (4.4°C)) OR HOT WEATHER (TEMPERATURE ABOVE 90°F (32.2°C))			X	TMS 602 ARTICLE 1.8C, 1.8D
VERIFY COMPLIANCE WITH REQUIRED INSPECTION PROVISIONS OF THE CONSTRUCTION DOCUMENTS AND THE APPROVED SUBMITTALS			X	
OBSERVE PREPARATION OF GROUT SPECIMENS, MORTAR SPECIMENS, AND/OR PRISMS		X		TMS 602 ARTICLE 1.4B.2a.3, 1.4B.2.b.3, 1.4B.2.c.3, 1.4B.3, 1.4B.4

A

TABLE 7 - STRUCTURAL OBSERVATIONS

OBSERVATION	QUANTITY
FOUNDATION INSPECTION	1 INSPECTION PRIOR TO CONCRETE POUR
WALL INSPECTION	1 INSPECTION OF SPECIAL REINFORCED SHEAR WALL
ROOF INSPECTION	1 INSPECTION DURING JOIST EMBED INSTALLATION
	1 INSPECTION DURING/AFTER METAL DECK INSTALLATION

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5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	8/15/25	AB	AH

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

STRUCTURAL
SPECIAL INSPECTION 2

Design by: M. ARIEF
Date: MAY 2025
Checked by: A. BECKWITH
Date: MAY 2025
Drawn by: G. GANESH
Date: MAY 2025
Checked by: A. HAHN
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 63 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

S-4

WW-00007

EQUIPMENT SLAB
PER DETAIL A/SD-2

1
S-7

41' - 7"
39' - 10"
1' - 2"
6"
7"
1' - 4"
11' - 0"
1' - 4"
11' - 8"
14' - 0"
3' - 0"
1' - 0"
11' - 6"
2' - 8"
COLUMN
PILASTER P1 PER
DETAIL L/SD-3
4" MINIMUM BUILDING
SEPARATION
(N) OPENING IN EXIST
CMU PER DETAIL
G/SD-4
2' - 0"
2' - 0"
1' - 2"
RE-ENTRATANT
CORNER
REINFORCING PER
DTL K/SD-1
N
~~(N) SLAB~~
~~INFILL AREA~~
2
S-7
(N) OPENING IN
EXIST CMU PER
DETAIL G/SD-4
MCJ
8" CONC SLAB
T/CONC 1197.40
MCJ
SAWCUT JOINT, (TYP)
20' - 0"
55' - 4"
57' - 8"
24' - 0"
4
S-7
MCJ
3' - 10"
6' - 0"
4' - 10"
RE-ENTRATANT
CORNER
REINFORCING PER
DTL K/SD-1
3' - 0"
1' - 0"
3' - 4"
MCJ
3
S-7
10' - 0"
1' - 2"
12' - 0"
3' - 4"
2' - 0"
MCJ
4" GAP
8"
15' - 4"
6' - 0"
17' - 4"
1' - 2"
40' - 6"
NEW PAD PER
DETAIL H/SD-1
~~EQUIPMENT SLAB~~
~~PER DETAIL A/SD-2~~

NOT IN SCOPE

3/16" = 1'- 0"
4 0 4 8

FOUNDATION PLAN
3/16" = 1'-0"

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REGISTERED PROFESSIONAL ENGINEER
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5-14-2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

STRUCTURAL
FOUNDATION PLAN

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @
SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE.
EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

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A	ADDENDUM 1	8/15/25	AB	AH

Revisions

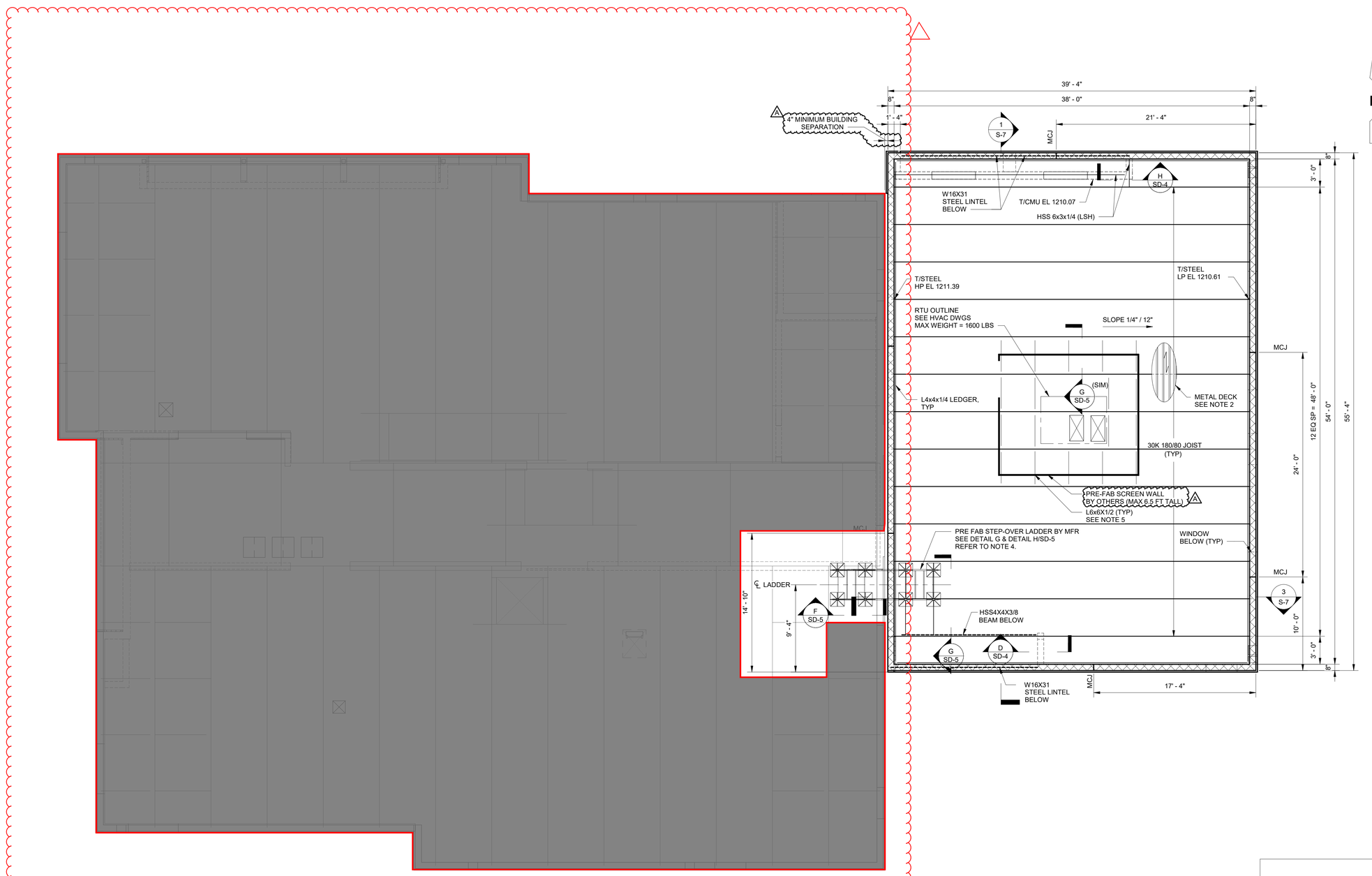
Design by: M. ARIEF
Date: MAY 2025
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REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 64 of 126 Sheets
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S-5

WW-00007



ROOF PLAN

3/16" = 1'-0"

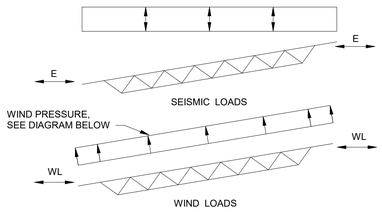
JOIST & DECK NOTES:

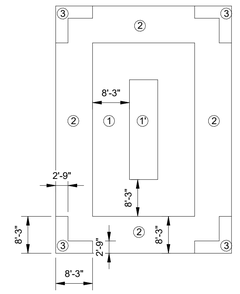
1. STEEL JOIST BRIDGING IS NOT SHOWN FOR CLARITY. PROVIDE JOIST BRIDGING PER STEEL JOIST INSTITUTE (SJI) SPECIFICATIONS. DESIGN OF JOIST BRIDGING IS BY STEEL JOIST MANUFACTURER.

JOIST LOAD DIAGRAM (STRENGTH LEVEL FORCES)

ASCE 7-16	
LOAD	KIPS
WL	1.3
E	6.1

Ev = 13 PSF





h=13'-8" COMPONENT AND CLADDING LOADING

2022 CALIFORNIA BUILDING CODE SECTION 1603.1.4-5		
ROOFING - JOISTS WIND PRESSURES (PSF) (STRENGTH LEVEL, 1.0W)		
ZONE	MAXIMUM POSITIVE PRESSURE	MAXIMUM SUCTION PRESSURE
1' (INTERIOR)	16.4	30.9
1 (INTERIOR)	16.4	47.9
2 (EDGE STRIP)	16.4	60.6
3 (CORNER)	16.4	80

2. ROOF DECK:
   A. DECK: 1.5B18GA BY VULCRAFT OR APPROVED EQUAL.
   B. SUPPORT FASTENERS:
      5/8" DIA PUDDLE WELDS @ 36/5 FASTENER PATTERN.
   C. SIDELAP FASTENERS:
      USE 5/8" PUDDLE WELDS @12" MAX SPACING.
3. JOISTS TO BE DESIGNED TO SUPPORT A 700 LB POINT LOAD TO BE APPLIED AT ANY PANEL POINT (NON-CONGRUENTLY).
4. JOISTS TO BE DEISGN FOR A MINIMUM VERTICAL REACTION OF DL= 150 LBS AND LL= 600 LBS (SERVICE LOAD) AT EACH SUPPORT POINT OF PRE FAB STEP-OVER LADDER.
5. VERIFY SIZE AND LOCATIONS OF ANGLES WITH PRE-FAB SCREEN WALL MANUFACTURER.

NOT IN SCOPE

3/16" = 1'- 0"

4 0 4 8

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REGISTERED PROFESSIONAL ENGINEER
ALAN HARRY HAHN
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5-14-2025

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Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

STRUCTURAL
ROOF PLAN

Design by: M. ARIEF
Date: MAY 2025
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Drawn by: G. GANESH
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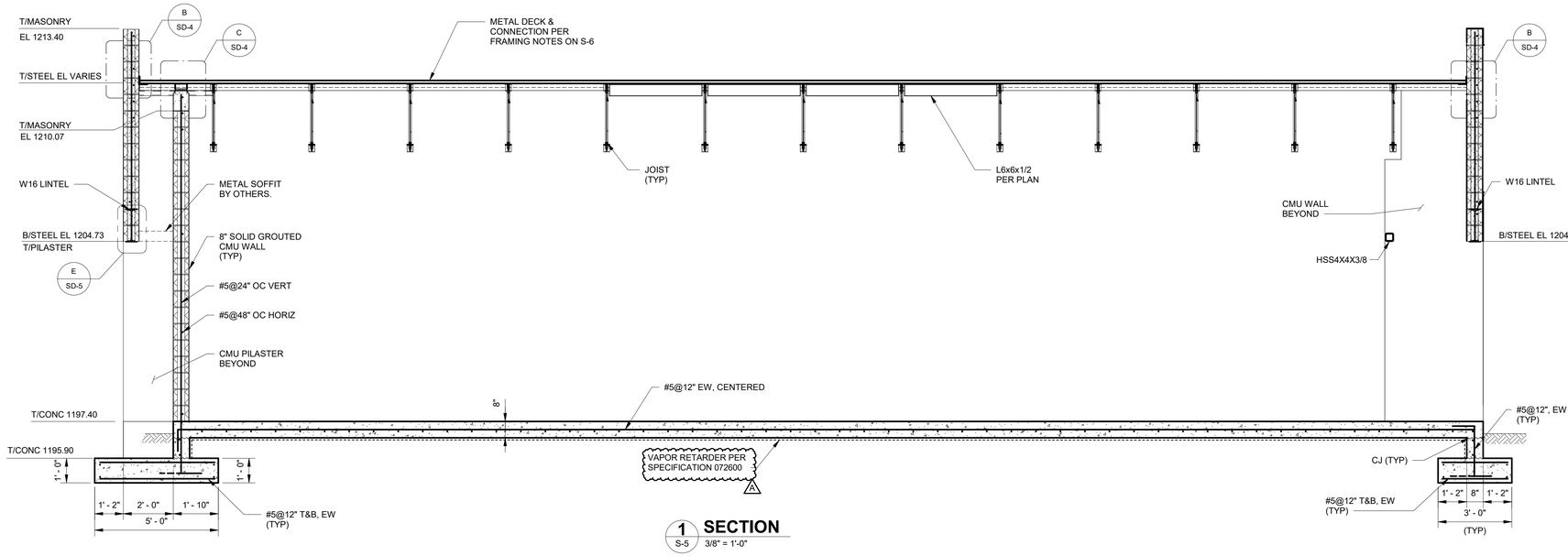
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

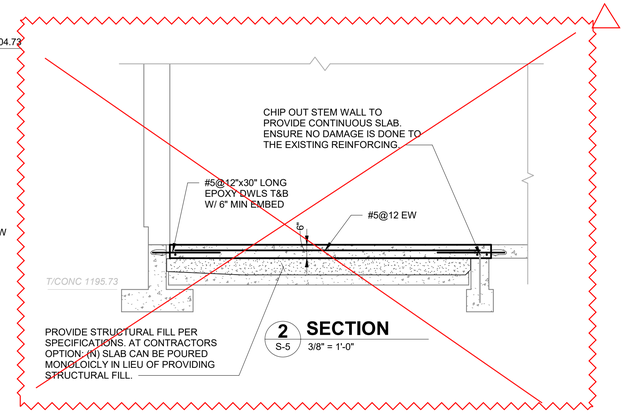
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Vert. AS SHOWN

S-6

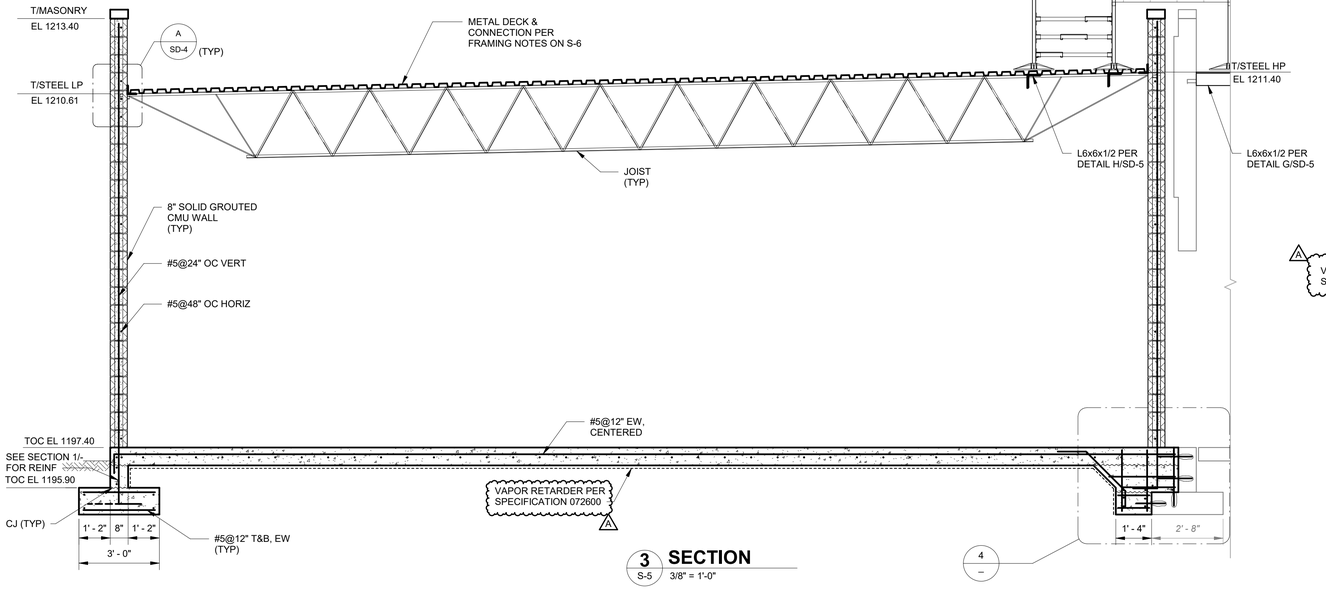
WW-00007



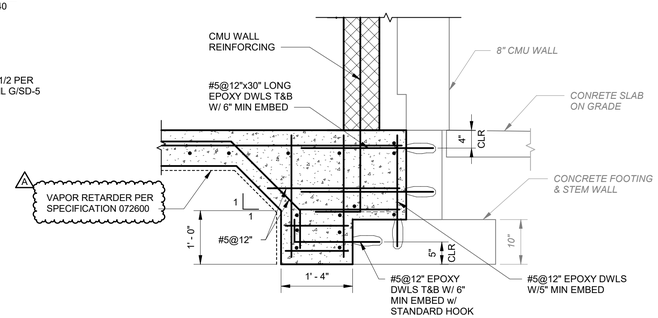
1 SECTION S-5 3/8" = 1'-0"



2 SECTION S-5 3/8" = 1'-0"



3 SECTION S-5 3/8" = 1'-0"



NOTE: ENSURE THERE IS NO UNDERMINING OF THE EXISTING FOOTING.

4 SECTION S-5 3/4" = 1'-0"

3/4" = 1'- 0"
1 0 1 2

3/8" = 1'- 0"
2 0 2 4

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Revisions

CITY OF REDLANDS

Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

STRUCTURAL
SECTIONS

Design by: M. ARIEF
Date: MAY 2025
Checked by: A. BECKWITH
Date: MAY 2025
Drawn by: G. GANESH
Date: MAY 2025
Checked by: A. HAHN
Date: MAY 2025

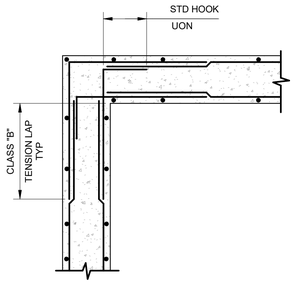
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 66 of 126 Sheets
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Vert. AS SHOWN

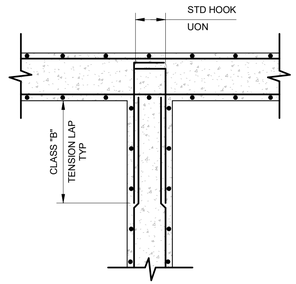
S-7

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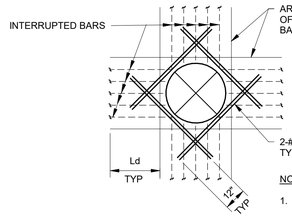
WALL CORNER REINFORCING

A DETAIL NTS



WALL INTERSECTION REINFORCING

B DETAIL NTS

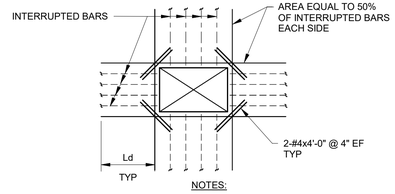


NOTES:

1. WHERE OPENING IS WITHIN 4'-0" OF BASE SLAB PROVIDE MATCHING DOWELS FOR ADDITIONAL BARS.
2. HOOK ADDITIONAL BARS WHERE REQUIRED LENGTH CANNOT BE OBTAINED.
3. ADDITIONAL BARS ARE NOT REQUIRED AT AN OPENING EDGE PARALLEL TO AND WITHIN 6 INCHES OF A SUPPORTING BEAM, SLAB OR WALL.

OPENINGS GREATER THAN 12"

C DETAIL NTS



NOTES:

1. WHERE WALL OPENING IS WITHIN 4'-0" OF BASE SLAB PROVIDE MATCHING DOWELS FOR ADDITIONAL BARS.
2. HOOK ADDITIONAL BARS WHERE REQUIRED LENGTH CANNOT BE OBTAINED.
3. ADDITIONAL BARS ARE NOT REQUIRED AT AN OPENING EDGE PARALLEL TO AND WITHIN 6 INCHES OF A SUPPORTING BEAM, SLAB OR WALL.

OPENINGS GREATER THAN 12"

D DETAIL NTS

REINF SIZE	DIAMETER. db (INCHES)	WALLS AND SLABS BAR SPACING ≥ 6 INCHES				BEAMS, COLUMNS, AND FOOTINGS BAR SPACING ≥ 3 db			
		ld (INCHES) FOR A STRIGHT BAR		ls (INCHES)		ld (INCHES) FOR A STRIGHT BAR		ls (INCHES)	
		TOP BAR	OTHER BARS	TOP BAR	OTHER BARS	TOP BAR	OTHER BARS	TOP BAR	OTHER BARS
#3	0.375	12	12	16	16	19	15	24	19
#4	0.5	15	12	20	16	25	19	32	25
#5	0.625	19	15	24	19	31	24	40	31
#6	0.75	22	17	29	22	37	29	48	37
#7	0.875	33	25	42	33	54	42	70	54
#8	1.0	37	29	48	37	62	48	80	62
#9	1.125	46	36	60	46	70	54	91	70
#10	1.375	57	44	74	57	79	61	102	79

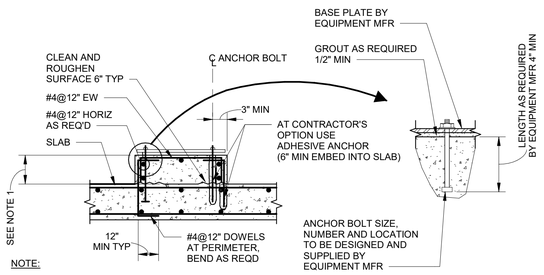
NOTES:

1. ld = DEVELOPMENT LENGTH, db = BAR DIAMETER, ls = LAP SPLICE LENGTH, ldh = DEVELOPMENT LENGTH FOR A BAR WITH STANDARD HOOK.
2. TOP BAR IS ANY HORIZONTAL BAR IN WALLS AND SLABS WITH MORE THAN 12" CONCRETE CAST IN ONE LIFT BENEATH IT. HORIZONTAL BARS IN WALLS SHALL BE CONSIDERED AS TOP BARS. VERTICAL BARS IN WALLS MAY BE CONSIDERED AS OTHER BARS.
3. SPLICES IN HORIZONTAL BARS SHALL BE STAGGERED, UON.
4. WHEN LAPPING DIFFERENT SIZE BARS USE LENGTH BASED ON LARGER BAR DIAMETER, UON.
5. TABLE IS BASED ON f'c = 4,000 PSI AND fy = 60,000 PSI. LAP SPLICE AND DEVELOPMENT LENGTHS SHALL BE INCREASED FOR LOWER CONCRETE COMPRESSIVE STRENGTH AS FOLLOWS

CONCRETE STRENGTH	MULTIPLIER
f'c = 2,500 PSI	1.27
f'c = 3,000 PSI	1.16

DEVELOPMENT LENGTH AND LAP SPLICE LENGTH (UON)

E DETAIL NTS

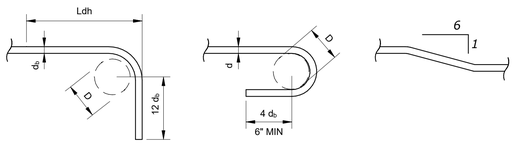


NOTE:

1. DIMENSIONS OF PAD AS REQUIRED TO SUIT EQUIPMENT (4" MIN UNLESS PAD IS CAST INTEGRALLY WITH SLAB).
2. DIMENSIONS AND LOCATIONS OF EQUIPMENT PADS WHERE SHOWN ON PLANS ARE APPROXIMATE. CONTRACTOR SHALL CONFIRM EQUIPMENT PAD SIZES AND LOCATIONS W/ MANUFACTURER OF APPROVED EQUIPMENT PRIOR TO FABRICATION AND CONSTRUCTION OF PAD.

EQUIPMENT PAD

H DETAIL NTS



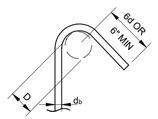
90° STD HOOK

180° DEGREE STD HOOK

MAX OFFSET BEND

D=6d FOR #3 TO #8
D=8d FOR #9 TO #11

PRINCIPAL REINFORCING



135° STD HOOK

MIN D=1 1/2" FOR #3
MIN D=2" FOR #4
MIN D=2 1/2" FOR #5

STIRRUPS AND TIES

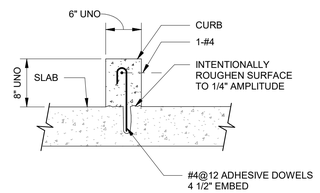
BAR SIZE	DIAMETER (d_b) (INCHES)	90° STD HOOK (L_{dh}) (INCHES)	90° STD HOOK ($12d_b$) (INCHES)	180° STD HOOK ($4d_b$) (INCHES)
#3	0.375	6	5	2
#4	0.5	7	6	2
#5	0.625	9	8	3
#6	0.75	11	9	3
#7	0.875	12	11	4
#8	1.0	14	12	4
#9	1.125	16	14	5
#10	1.25	17	16	6
#11	1.375	19	17	6

NOTE:

1. ALL BENDS SHALL BE MADE COLD.

BAR BENDS

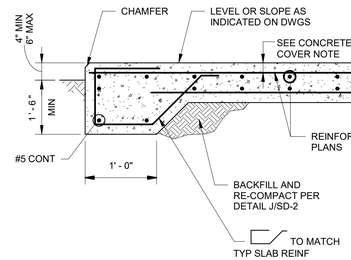
F DETAIL NTS



NON-CHEMICAL CONTAINMENT AREA

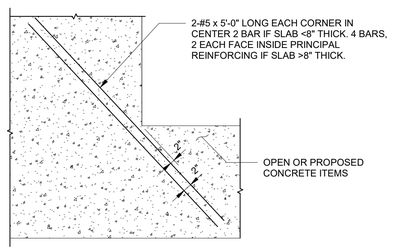
CURB AT SLAB

J DETAIL NTS



THICKENED SLAB ON GRADE EDGE

G DETAIL NTS



NOTES:

1. TYPICALLY REQUIRED UNLESS ADDITIONAL REINFORCEMENT SPECIFICALLY INDICATED ON DRAWINGS.

EXTRA REINFORCING AT RE-ENTRANT CORNERS

K DETAIL NTS

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER
ALAN HARRY HAHN
C 82421
CIVIL
STATE OF CALIFORNIA
5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

STRUCTURAL STANDARD DETAILS 1

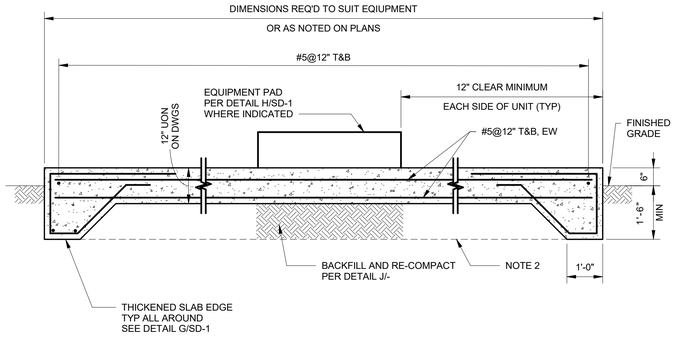
Design by: M. ARIEF
Date: MAY 2025
Checked by: A. BECKWITH
Date: MAY 2025
Drawn by: G. GANESH
Date: MAY 2025
Checked by: A. HAHN
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 67 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

SD-1

WW-00007

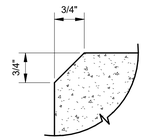


NOTES:

1. PADS FOR PUBLIC UTILITY EQUIPMENT SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE APPROPRIATE AGENCIES REQUIREMENTS.
2. AT CONTRACTOR'S OPTION, PROVIDE A UNIFORM THICK SLAB.

EXTERIOR EQUIPMENT SLAB

A DETAIL NTS

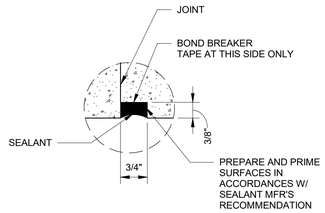


NOTES:

1. NO CHAMFER REQUIRED WHERE FLUSH EXTERIOR CMU OR BRICK MASONRY ABOVE.

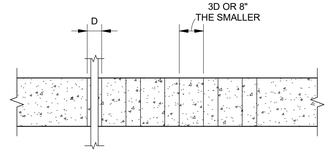
CHAMFER

B DETAIL NTS

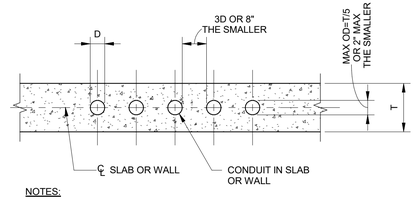


JOINT SEALANT

C DETAIL NTS



PIPING THROUGH SLAB OR WALL

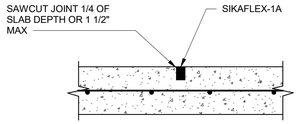


NOTES:

1. PLACE CONDUITS IN MIDDLE THIRD OF SLAB OR WALL.
2. WHERE REQUIRED CLEAR DISTANCE BETWEEN SLEEVES IS IMPOSSIBLE THIS AREA SHALL BE TREATED AS A SLAB OPENING OR AS A WALL OPENING.

PIPING AND CONDUIT IN OR THROUGH SLAB OR WALL

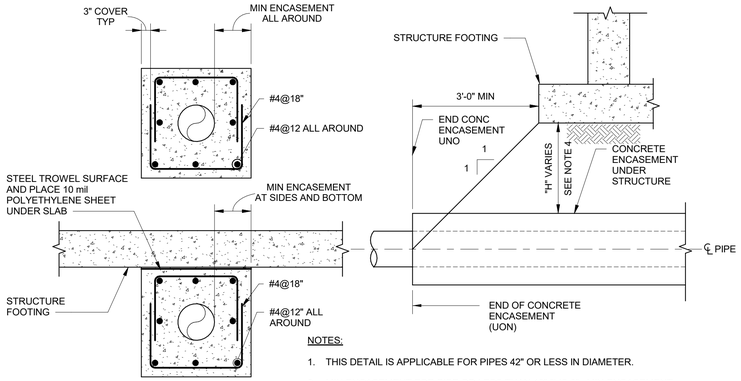
D DETAIL NTS



SINGLE MAT

SAWCUT JOINT

E DETAIL NTS

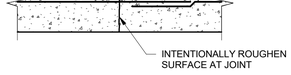


NOTES:

1. THIS DETAIL IS APPLICABLE FOR PIPES 42" OR LESS IN DIAMETER.
2. MIN ENCASEMENT FOR PIPE OD LESS THAN 12"∅ IS 6". MIN ENCASEMENT FOR PIPE OD 12"∅ AND GREATER IS 12".
3. REINFORCEMENT TO BE PROVIDED IN ENCASEMENTS FOR PIPES GREATER THAN 12".
4. EXTEND ENCASEMENT UP TO UNDERSIDE OF SLAB IF ANY POINT H < 6".

CONCRETE PIPE ENCASEMENT

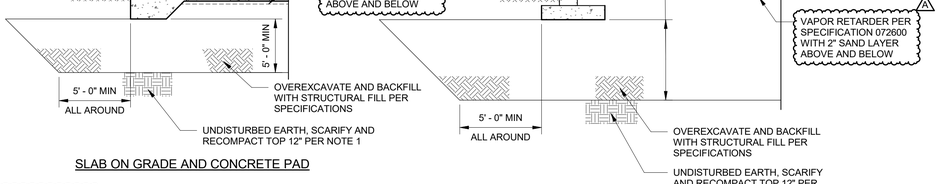
F DETAIL NTS



SINGLE MAT

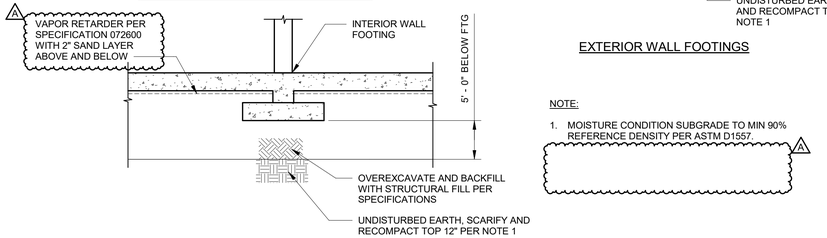
SLAB/WALL CONSTRUCTION JOINT

G DETAIL NTS



SLAB ON GRADE AND CONCRETE PAD

EXTERIOR WALL FOOTINGS



INTERIOR WALL FOOTING

NOTE:

1. MOISTURE CONDITION SUBGRADE TO MIN 90% REFERENCE DENSITY PER ASTM D1557.

H DETAIL NTS

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	8/15/25	AB	AH

Revisions

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER
ALAN HARRY HAHN
C 82421
CIVIL
STATE OF CALIFORNIA
5-14-2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

STRUCTURAL STANDARD DETAILS 2

Design by: M. ARIEF
Date: MAY 2025
Checked by: A. BECKWITH
Date: MAY 2025
Drawn by: G. GANESH
Date: MAY 2025
Checked by: A. HAHN
Date: MAY 2025

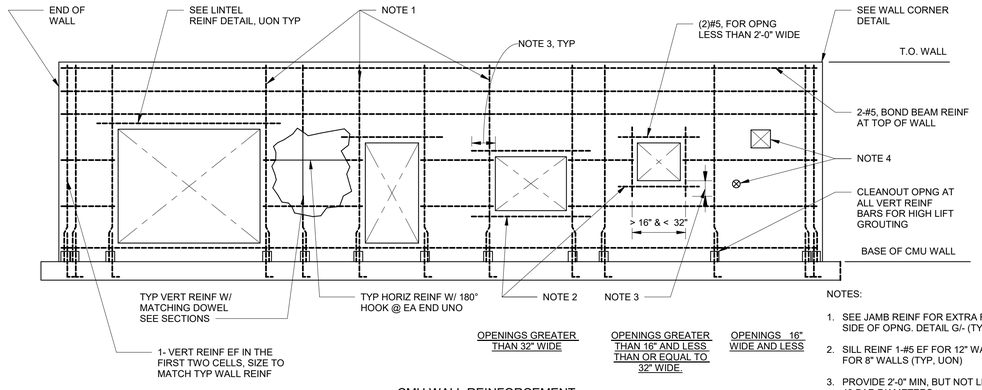
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 68 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

SD-2

WW-00007



CMU WALL REINFORCEMENT

A DETAIL
NTS

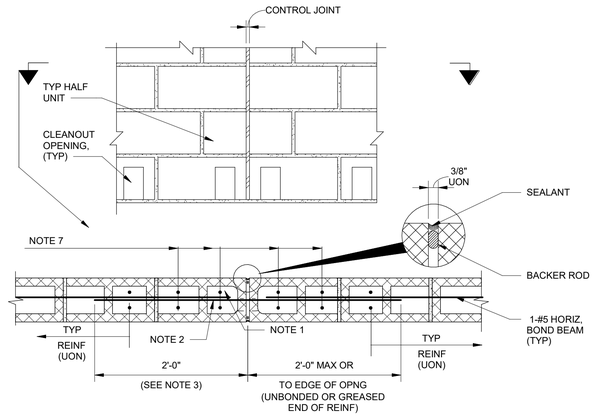
OPENINGS GREATER THAN 32" WIDE	OPENINGS GREATER THAN 16" AND LESS THAN OR EQUAL TO 32" WIDE.	OPENINGS 16" WIDE AND LESS

NOTES:

1. SEE JAMB REINF FOR EXTRA REINF @ SIDE OF OPNG. DETAIL G/- (TYP, UON)
2. SILL REINF 1-#5 EF FOR 12" WALLS, 1-#5 FOR 8" WALLS (TYP, UON)
3. PROVIDE 2'-0" MIN, BUT NOT LESS THAN 48 BAR DIAMETERS.
4. NO ADDL REINF REQ UNLESS OPNG INTERRUPTS TYP HORIZ OR VERT REINF. WHERE TYP REINF IS INTERRUPTED PROVIDE HORIZ AND/OR VERT REINF MATCHING HORIZ AND/OR VERT REINF ADJACENT TO PENETRATION FOR OPNGS GREATER THAN 16" AND LESS THAN OR EQUAL TO 32" WIDE.

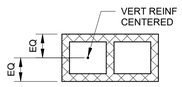
NOTES:

1. TERMINATE HORIZ REINFORCING WITH A STD HOOK TWO INCHES FROM CONTROL JOINTS, UON.
2. PROVIDE SMOOTH DOWELS ACROSS THE JOINT AT HORIZ BAR LOCATIONS. PREVENT BOND BETWEEN BAR AND GROUT ON ONE SIDE OF JOINT WITH GREASE OR A PLASTIC SLEEVE. CAP ALL DOWELS TO ALLOW ONE INCH OF MOVEMENT.
3. PROVIDE STD HOOK ON SIDE WITH BOND IF 2'-0" LENGTH IS NOT POSSIBLE.
4. CONTINUE HORIZ REINF THROUGH MCJ @ BEAM BEARING, DECK BEARING, T.O.W. BOND BEAMS AND LINTEL REINF.
5. DISCONTINUE HORIZONTAL JOINT REINFORCEMENT CEMENT AT THE MCJ.
6. DOUBLE BOND BEAM SHOWN. SIMILAR FOR SINGLE BOND BEAM.
7. FOR 8" CMU, 2 CELLS OF 2-#5 CONT W/ MATCHING DOWELS, EACH SIDE OF MCJ.



MASONRY CONTROL JOINT (MCJ)

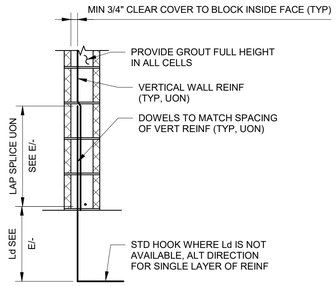
B DETAIL
NTS

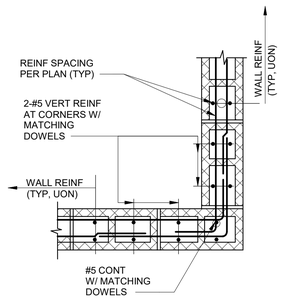


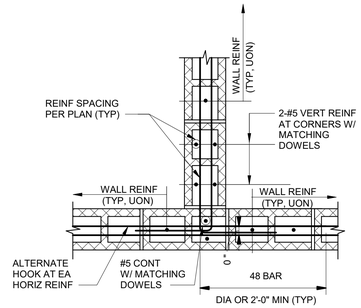
BAR SIZE	MIN LAP LENGTH (in)	
	BARS CENTERED	BARS E.F.
4	21	36
5	26	45
6	43	48
7	60	63

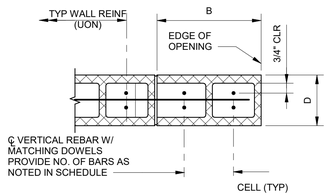
NOTES:

1. MASONRY LAP SPLICES APPLICABLE FOR TMS 402 & CBC 2022.
2. SEE DRAWINGS OR OBTAIN ENGINEER OF RECORD APPROVAL FOR SPLICE LENGTHS NOT SHOWN.









OPNG WIDTH	CMU JAMB REINFORCING		
	B	D	VERT REINF
0'-0" TO < 3'-4"	16"	8"	2-#5 PER CELL 1 EF
3'-5" TO < 6'-8"	24"	8"	2-#5 PER CELL 1 EF
6'-9" TO < 9'-4"	32"	8"	2-#5 PER CELL 1 EF

CMU CLEAR COVER

C DETAIL
NTS

CMU LAP SPLICES

D DETAIL
NTS

CMU DOWEL TO CONC

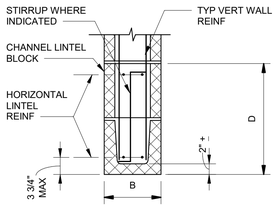
E DETAIL
NTS

8" CMU WALL CORNERS

F DETAIL
NTS

CMU WALL OPENING JAMB REINFORCING

G DETAIL
NTS



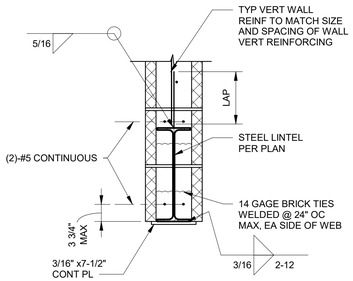
SPAN	CMU LINTEL REINFORCING			
	B	D	HORIZ REINF	STIRRUPS
0'-0" TO < 3'-4"	8"	8"	2-#5	-
3'-5" TO < 6'-8"	8"	16"	2-#5	-
6'-9" TO < 9'-4"	8"	32"	4-#5	-

NOTES:

1. PROVIDE 8" MIN BEARING AT EA SIDE OF CLEAR SPAN UNLESS OTHERWISE NOTED.
2. PROVIDE REINF AS INDICATED AT ALL OPENINGS ON THE DRAWINGS.
3. SPECIAL INSPECTION OF ALL LINTELS IS REQUIRED.

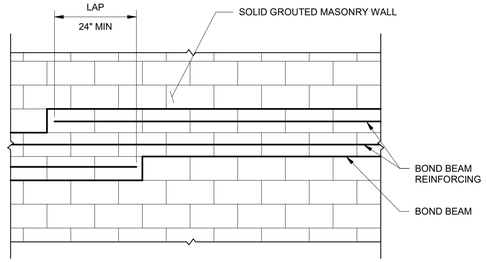
CMU LINTEL REINFORCING

H DETAIL
NTS



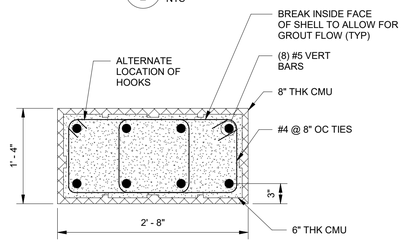
STEEL LINTEL

J DETAIL
NTS



STEPPED BOND BEAM

K DETAIL
NTS



NOTE: MATCH HORIZONTAL AND VERTICAL REINFORCING IN CONCRETE PIER BELOW.

PILASTER P1

CMU PILASTER

L DETAIL
NTS

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER ALAN HARRY HAHN C 82421 CIVIL STATE OF CALIFORNIA
5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

STRUCTURAL STANDARD DETAILS 3

Design by: M. ARIEF
Date: MAY 2025
Checked by: A. BECKWITH
Date: MAY 2025
Drawn by: G. GANESH
Date: MAY 2025
Checked by: A. HAHN
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

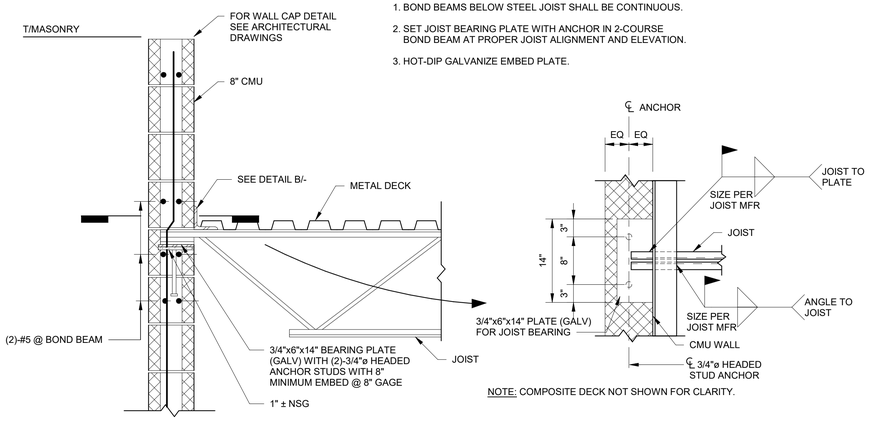
Sheet 69 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

SD-3

WW-00007

NOTES:

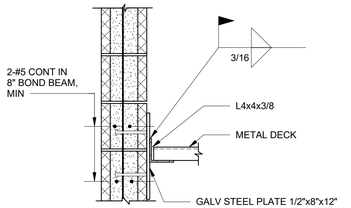
1. BOND BEAMS BELOW STEEL JOIST SHALL BE CONTINUOUS.
2. SET JOIST BEARING PLATE WITH ANCHOR IN 2-COURSE BOND BEAM AT PROPER JOIST ALIGNMENT AND ELEVATION.
3. HOT-DIP GALVANIZE EMBED PLATE.



NOTE: COMPOSITE DECK NOT SHOWN FOR CLARITY.

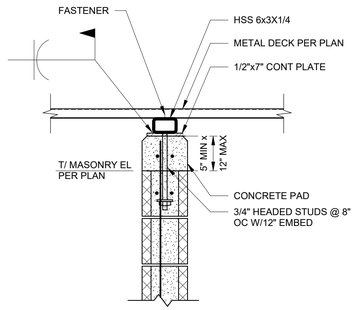
JOIST/DECK TO CMU

A DETAIL NTS



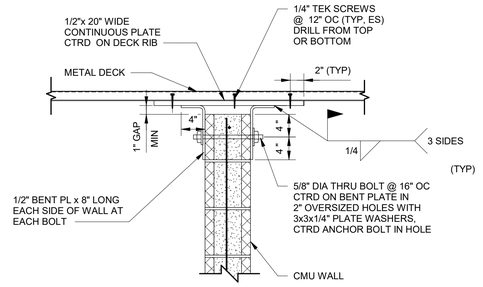
LEDGER ANGLE

B DETAIL NTS



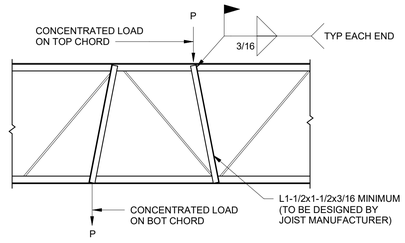
MASONRY BLOCKING CONNECTION

C DETAIL NTS



METAL DECK TO INTERIOR CMU CONNECTION (UNO)

D DETAIL NTS

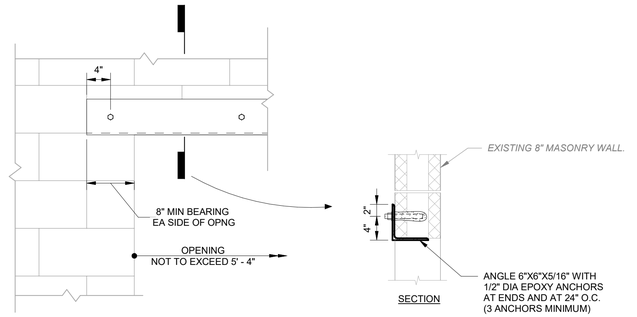


CONCENTRATED LOAD REINFORCEMENT

F DETAIL NTS

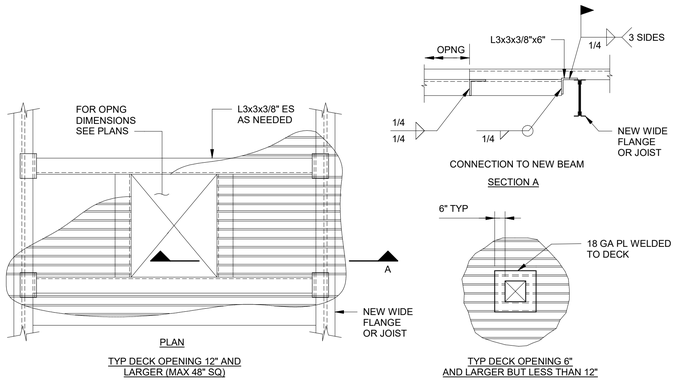
INSTALLATION PROCEDURE:

1. INSTALL STEEL ANGLE LINTEL INTO EXISTING MORTAR JOINT OR SAW CUT 3/8" HORIZONTAL CUT TO ALLOW PLACEMENT OF HORIZONTAL LEG.
2. INSTALL ANCHOR BOLTS.
3. REMOVE MASONRY FOR OPENING.
4. DO NOT OVERCUT MASONRY.



STEEL LINTEL ANCHORAGE

G DETAIL NTS

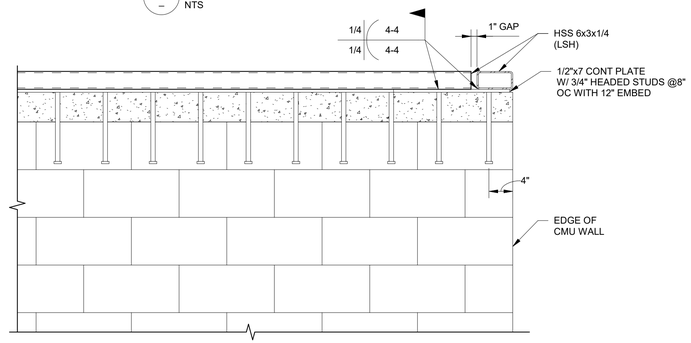


NOTES:

1. PROVIDE TYP DECK & END ATTACHMENTS ALL SIDES OF OPNG.
2. SEE PLANS FOR FRAMING SIZES AT OPNGS LARGER THAN 4'-0" SQ.

ROOF OPENING FRAMING

E DETAIL NTS



STEEL LINTEL ANCHORAGE

H DETAIL NTS

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Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER ALAN HARRY HAHN C 82421 CIVIL STATE OF CALIFORNIA
5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

STRUCTURAL STANDARD DETAILS 4

Design by: M. ARIEF
Date: MAY 2025
Checked by: A. BECKWITH
Date: MAY 2025
Drawn by: G. GANESH
Date: MAY 2025
Checked by: A. HAHN
Date: MAY 2025

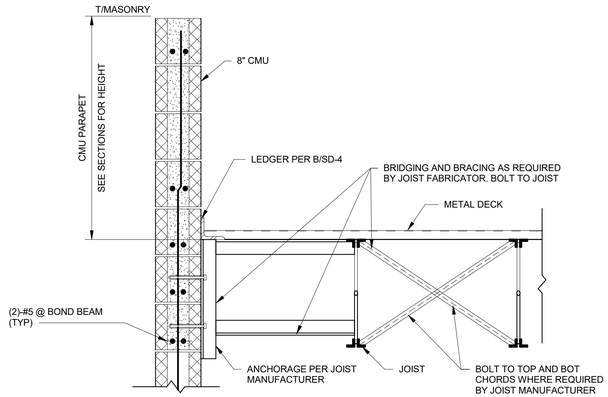
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 70 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

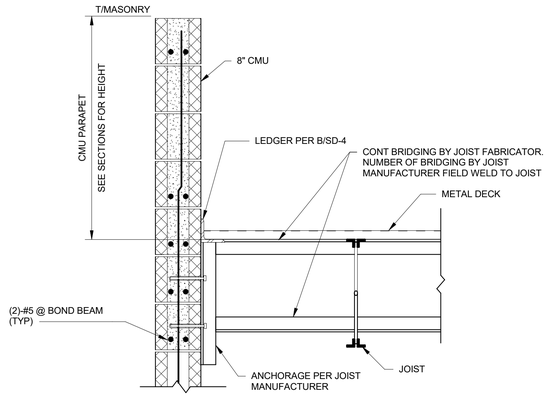
SD-4

WW-00007



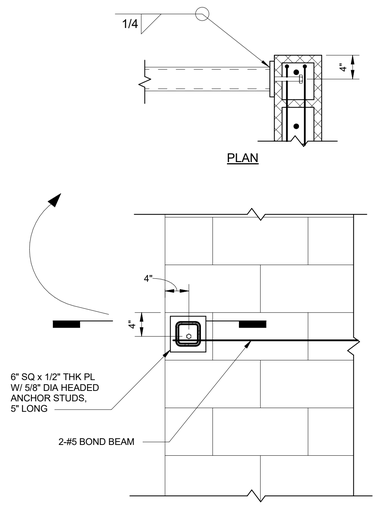
BOLTED DIAGONAL BRACING

A DETAIL
NTS



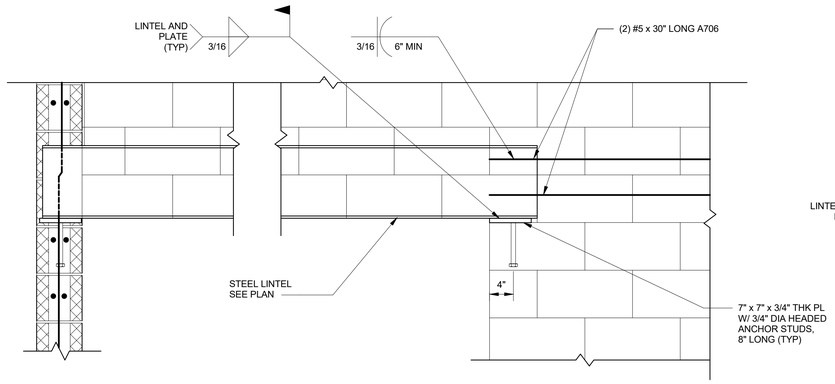
HORIZONTAL BRIDGING

B DETAIL
NTS



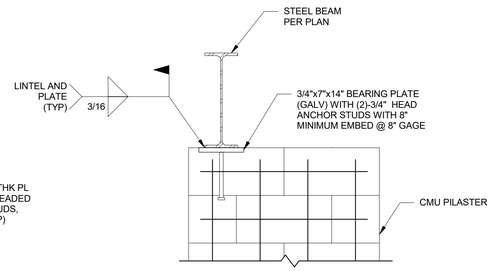
STEEL BEAM ANCHORAGE

C DETAIL
NTS



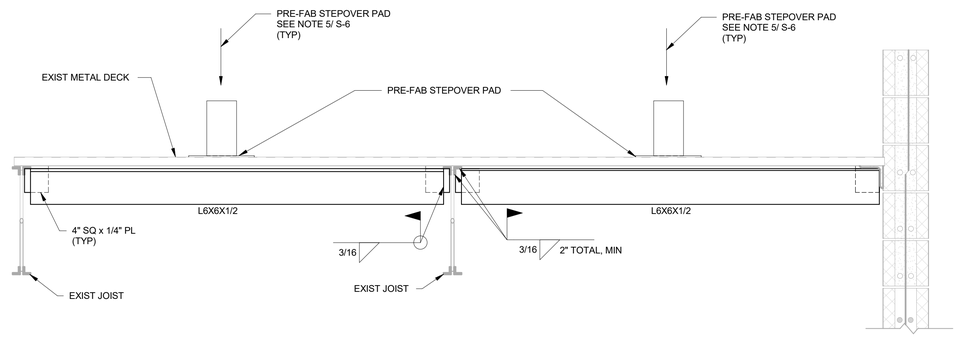
STEEL LINTEL ANCHORAGE

D DETAIL
NTS



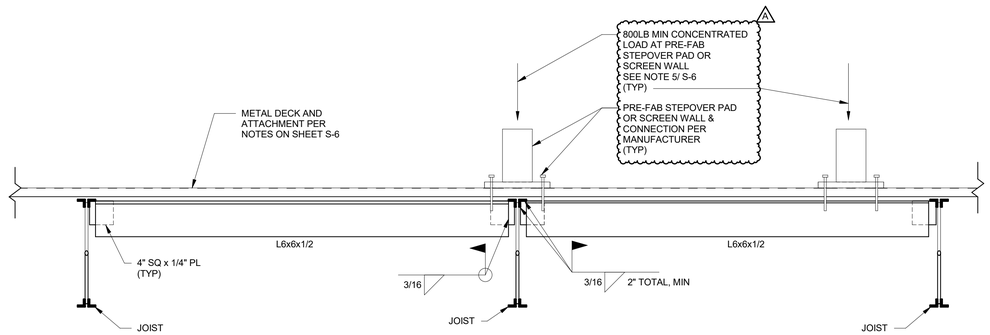
NOTE: CMU WALL ABOVE NOT SHOWN FOR CLARITY.

E DETAIL
1" = 1'-0"



ADDL FRAMING AT STEP OVER LADDER @ EXISTING BUILDING

F DETAIL
NTS



ADDL FRAMING AT STEP OVER LADDER

G DETAIL
NTS

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	8/15/25	AB	AH

Revisions

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER ALAN HARRY HAHN C 82421 CIVIL STATE OF CALIFORNIA
5-14-2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

STRUCTURAL STANDARD DETAILS 5

Design by: M. ARIEF
Date: MAY 2025
Checked by: A. BECKWITH
Date: MAY 2025
Drawn by: G. GANESH
Date: MAY 2025
Checked by: A. HAHN
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

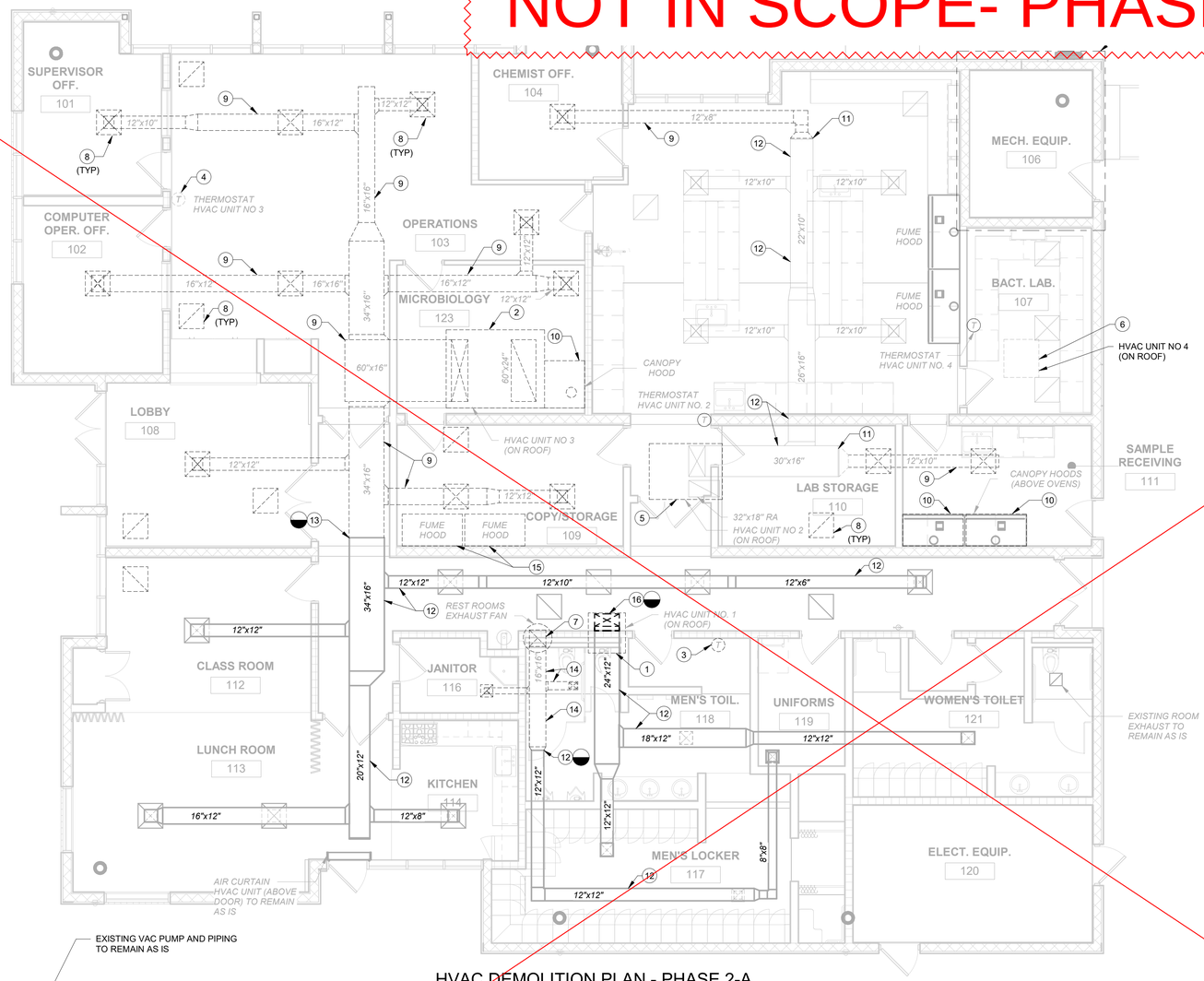
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 71 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

SD-5

WW-00007

NOT IN SCOPE- PHASE 2

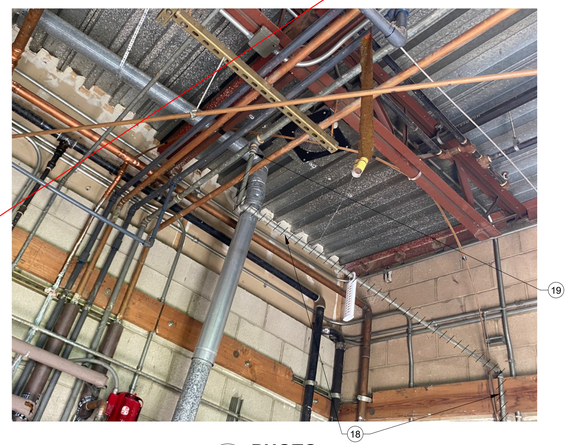


HVAC DEMOLITION PLAN - PHASE 2-A

3/16" = 1'-0"



1 PHOTO
NTS



2 PHOTO
NTS

3/16" = 1'- 0"
4 0 4 8

HVAC DEMOLITION NOTES - PHASE 2-A:

1. REMOVE ALL DUCTWORK, HVAC EQUIPMENT AND AIR DEVICES (DIFFUSERS AND GRILLES) SHOWN WITH DASHED LINE TYPE OR HATCHED UNLESS NOTED OTHERWISE.
2. ALL HVAC EQUIPMENT, DUCTWORK AND AIR DEVICES (DIFFUSERS AND GRILLES) SHOWN WITH SOLID LINE TYPE ARE EXISTING TO REMAIN AS IS.

HVAC KEYNOTES - PHASE 2-A:

1. REMOVE EXISTING HVAC UNITS NO 1 (ON ROOF) AND ALL RELATED CONTROLS AND ACCESSORIES.
2. REMOVE EXISTING HVAC UNITS NO 3 (ON ROOF) AND ALL RELATED CONTROLS AND ACCESSORIES.
3. REMOVE EXISTING THEROMSTAT SERVING HVAC UNIT NO 1.
4. REMOVE EXISTING THEROMSTAT SERVING HVAC UNIT NO 3.
5. HVAC UNITS NO 2 (ON ROOF) WILL REMAIN AS IS AND ALL RELATED CONTROLS.
6. HVAC UNITS NO 4 (ON ROOF) WILL REMAIN AS IS AND ALL RELATED CONTROLS.
7. REMOVE EXHAUST FAN (ON ROOF) SERVING RESTROOMS AND LOCKERS.
8. REMOVE EXISTING DIFFUSER AND/OR GRILLE.
9. REMOVE EXISTING DUCTWORK.
10. REMOVE EXISTING CANOPY HOOD AND ALL RELATED DUCTWORK AND ACCESSORIES BETWEEN THE HOOD AND THE EXHAUST FAN ON ROOF.
11. CUT AND CAP EXISTING DUCT AIRTIGHT.
12. EXISTING DUCTWORK TO REMAIN AS IS.
13. CUT AND CAP EXISTING DUCT FOR CONNECTION TO NEW DUCTWORK FROM NEW HVAC UNIT PACU-1.
14. REMOVE EXISTING EXHAUST DUCT.
15. REMOVE EXISTING EXHAUST DUCTWORK BETWEEN THE FUME HOOD AND THE EXHAUST FAN ON ROOF.
16. REMOVE 24"X12" DUCT UP TO HVAC UNIT NO 1.
17. REMOVE EXISTING AIR COMPRESSOR AND TURN OVER TO OWNER. SEE PHOTOS 1 AND 2 ON THIS DRAWING.
18. REMOVE EXISTING COMPRESSED AIR (CA) PIPE AND ACCESSORIES. SEE PHOTO 2 ON THIS DRAWING FOR CONTINUATION.
19. CAP EXISTING CA PIPE AT THE TEE CONNECTION. SEE PHOTO 2 ON THIS DRAWING.

HVAC DEMOLITION LEGEND - PHASE 2-A:

- EXISTING SUPPLY AIR DIFFUSER TO BE REMOVED.
- EXISTING RETURN/EXHAUST AIR GRILLE TO BE REMOVED.
- EXISTING SUPPLY AIR DIFFUSER TO REMAIN AS IS.
- EXISTING RETURN/EXHAUST AIR GRILLE TO REMAIN AS IS.
- EXISTING TOILET EXHAUST AIR GRILLE TO REMAIN AS IS.
- EXISTING TOILET SUPPLY AIR DIFFUSER TO REMAIN AS IS.

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Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED PROFESSIONAL ENGINEER — SAID YASIR IBRAHIM — M 39357 — MECHANICAL — STATE OF CALIFORNIA
5/14/2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

HVAC DEMOLITION FLOOR PLAN - PHASE 2-A

Design by: S. IBRAHIM
Date: MAY 2025
Checked by: S. GOPIKUMAR
Date: MAY 2025
Drawn by: G. NITHIYAN
Date: MAY 2025
Checked by: S. IBRAHIM
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 72 of 126 Sheets
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Vert. AS SHOWN

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MD-1

Last Saved by: G. NITHIYAN Time: 5/12/2025 10:33:15 AM
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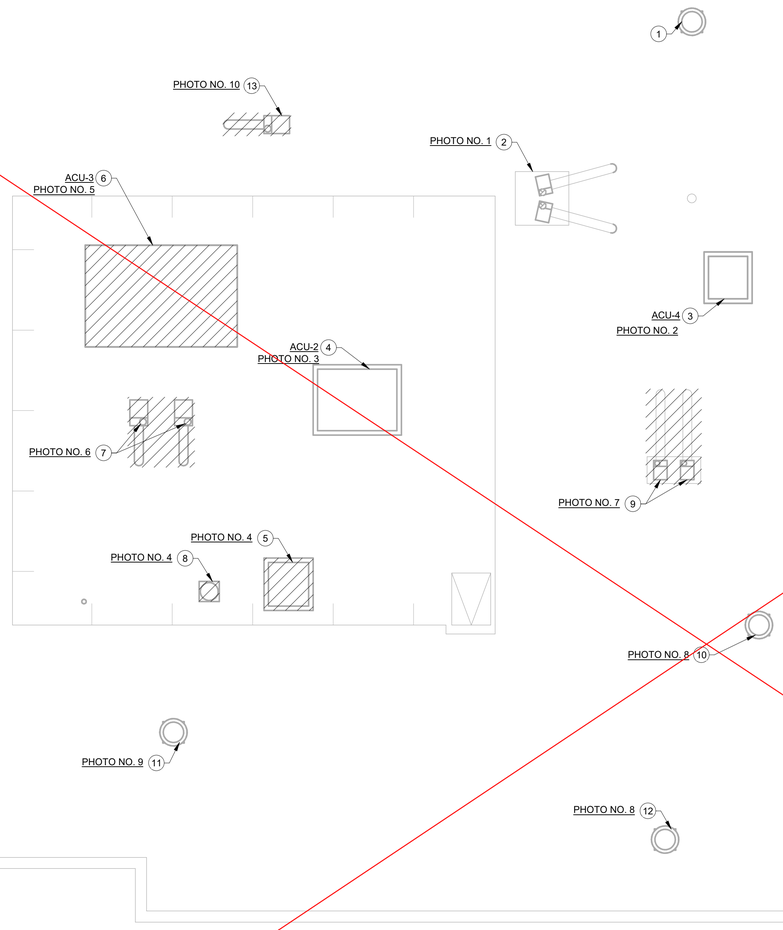
NOT IN SCOPE- PHASE 2

...UITS SERVING ALL EXISTING HVAC UNITS TO

2. CAP EXISTING ROOF CURB OPENING WITH DOUBLE WALL INSULATED STAINLESS STEEL SHEETMETAL. MIN INSULATION THERMAL VALUE SHOULD BE R-30.

HVAC DEMOLITION KEYNOTES - PHASE 2-A:

1. MECHANICAL ROOM EXHAUST DUCT WILL REMAIN AS IS.
2. FUME HOOD EXHAUST FANS WILL REMAIN AS IS. SEE PHOTO NO 1.
3. HVAC UNIT NO 4 WILL REMAIN AS IS. SEE PHOTO NO 2.
4. HVAC UNIT NO 2 WILL REMAIN AS IS. SEE PHOTO NO 3.
5. REMOVE HVAC UNIT NO 1 AND ALL RELATED CONTROLS AND ACCESSORIES. SEE PHOTO NO 4. SEE HVAC DEMOLITION NOTE 2 ON THIS DRAWING.
6. REMOVE HVAC UNIT NO 3 AND ALL RELATED CONTROLS AND ACCESSORIES. SEE PHOTO NO 5. SEE HVAC DEMOLITION NOTE 2 ON THIS DRAWING.
7. REMOVE FUME HOOD EXHAUST FANS AND ALL RELATED DUCTWORK AND ACCESSORIES. SEE PHOTO NO 6.
8. REMOVE RESTROOMS EXHAUST FAN. SEE PHOTO NO 4.
9. REMOVE CANOPY HOOD EXHAUST FANS AND ALL RELATED DUCTWORK AND ACCESSORIES. SEE PHOTO NO 7.
10. EXISTING FAN WILL REMAIN AS IS. SEE PHOTO NO 8.
11. EXISTING FAN WILL REMAIN AS IS. SEE PHOTO NO 9.
12. EXISTING DUCT WILL REMAIN AS IS. SEE PHOTO NO 8.
13. REMOVE EXHAUST FANS AND ALL RELATED DUCTWORK AND ACCESSORIES. SEE PHOTO NO 10.



HVAC ROOF DEMOLITION PLAN - PHASE 2-A
3/16" = 1'-0"



1 PHOTO NTS



2 PHOTO NTS



3 PHOTO NTS



4 PHOTO NTS



5 PHOTO NTS



6 PHOTO NTS



7 PHOTO NTS



8 PHOTO NTS



9 PHOTO NTS



10 PHOTO NTS

3/16" = 1'- 0"
4 0 4 8

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED PROFESSIONAL ENGINEER
SAID YASIR IBRAHIM
M 39357
MECHANICAL
STATE OF CALIFORNIA
5/14/2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

HVAC DEMOLITION ROOF PLAN - PHASE 2-A

Design by: S. IBRAHIM
Date: MAY 2025
Checked by: S. GOPIKUMAR
Date: MAY 2025
Drawn by: G. NITHYAN
Date: MAY 2025
Checked by: S. IBRAHIM
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

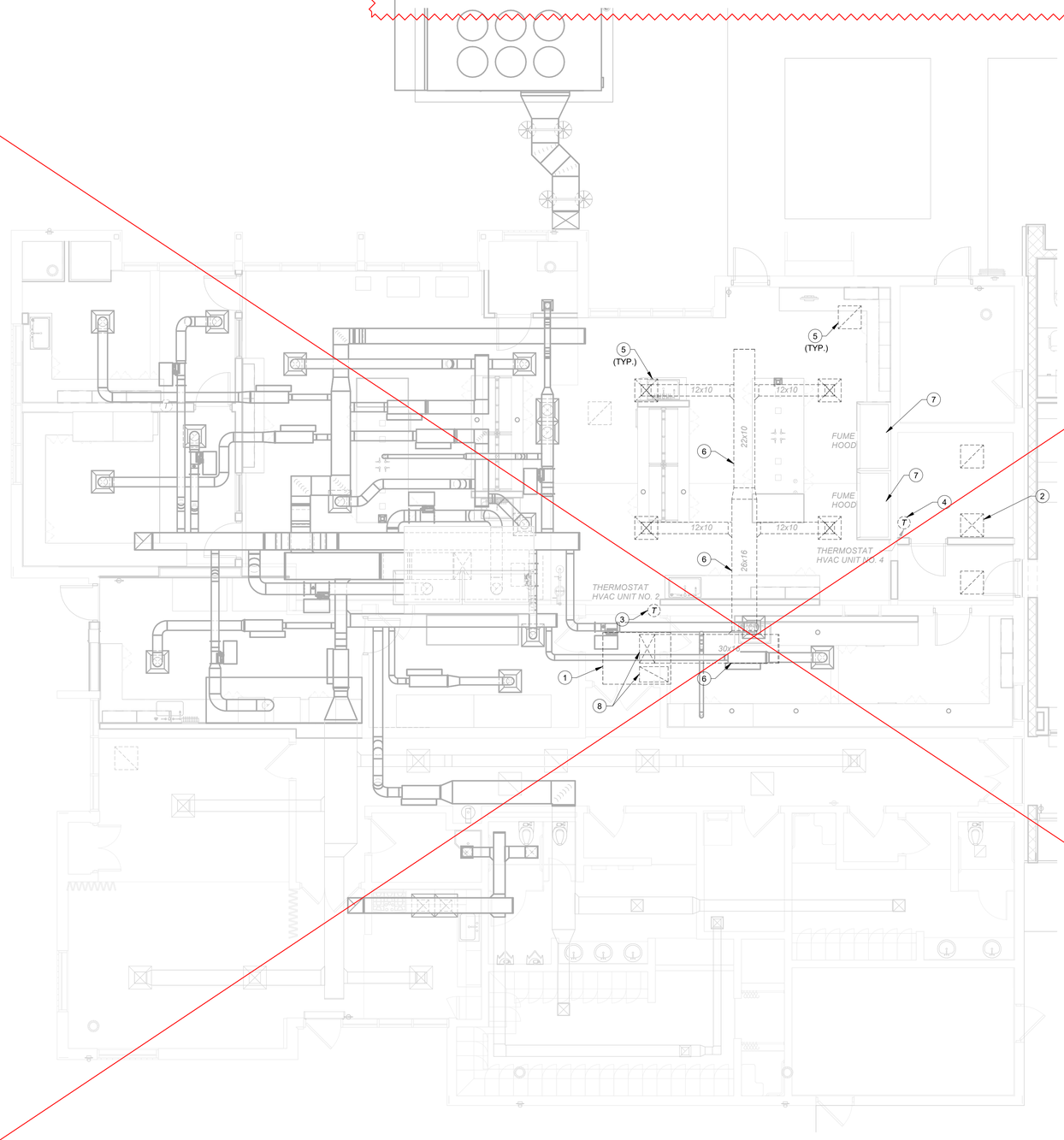
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Vert. AS SHOWN

MD-2

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NOT IN SCOPE- PHASE 2



HVAC DEMOLITION PLAN - PHASE 2-B

3/16" = 1'-0"

N

HVAC DEMOLITION NOTES - PHASE 2-B:

1. REMOVE ALL DUCTWORK AND AIR DEVICES (DIFFUSERS AND GRILLES) SHOWN WITH DASHED LINE TYPE UNLESS NOTED OTHERWISE.

HVAC KEYNOTES - PHASE 2-B:

1. REMOVE EXISTING HVAC UNITS NO 2 (ON ROOF) AND ALL RELATED DUCTWORK, CONTROLS AND ACCESSORIES.
2. REMOVE EXISTING HVAC UNITS NO 4 (ON ROOF) AND ALL RELATED DUCTWORK, CONTROLS AND ACCESSORIES.
3. REMOVE EXISTING THEROMSTAT SERVING HVAC UNIT NO 2.
4. REMOVE EXISTING THEROMSTAT SERVING HVAC UNIT NO 4.
5. REMOVE EXISTING DIFFUSER AND/OR GRILLE.
6. REMOVE EXISTING DUCTWORK.
7. REMOVE EXISTING EXHAUST DUCTWORK BETWEEN THE FUME HOODS AND THE EXHAUST FANS ON ROOF AND ALL RELATED ACCESSORIES.
8. REMOVE EXISTING SUPPLY AND RETURN AIR DUCTS UP TO HVAC UNIT NO 2.

HVAC DEMOLITION LEGEND - PHASE 2-B:

EXISTING SUPPLY AIR DIFFUSER TO BE REMOVED.

EXISTING RETURN/EXHAUST AIR GRILLE TO BE REMOVED.

3/16" = 1'- 0"

4 0 4 8

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED PROFESSIONAL ENGINEER — SAID YASIR IBRAHIM — M 39357 — MECHANICAL — STATE OF CALIFORNIA

5/14/2025

CITY OF REDLANDS

Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

HVAC DEMOLITION FLOOR PLAN - PHASE 2-B

Design by: S. IBRAHIM
Date: MAY 2025
Checked by: S. GOPIKUMAR
Date: MAY 2025
Drawn by: G. NITHIYAN
Date: MAY 2025
Checked by: S. IBRAHIM
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

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Vert. AS SHOWN

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NOT IN SCOPE- PHASE 2



HVAC DEMOLITION ROOF PLAN - PHASE 2-B

3/16" = 1'-0"

N

HVAC DEMOLITION NOTES - PHASE 2-B:

1. REMOVE ALL ASSOCIATED ELECTRICAL CIRCUITS AND CONDUITS SERVING ALL EXISTING HVAC UNITS TO BE REMOVED BACK TO IT'S SOURCE.
2. CAP EXISTING ROOF CURB OPENING WITH DOUBLE WALL INSULATED STAINLESS STEEL SHEETMETAL. MIN INSULATION THERMAL VALUE SHOULD BE R-30.

HVAC DEMOLITION KEYNOTES - PHASE 2-B:

1. MECHANICAL ROOM EXHAUST DUCT WILL REMAIN AS IS.
2. REMOVE FUME HOOD EXHAUST FANS AND ALL RELATED DUCTWORK AND ACCESSORIES. SEE PHOTO NO 1.
3. REMOVE HVAC UNIT NO 4 AND ALL RELATED CONTROLS AND ACCESSORIES. SEE PHOTO NO 2. SEE HVAC DEMOLITION NOTE 2 ON THIS DRAWING.
4. REMOVE HVAC UNIT NO 2 AND ALL RELATED CONTROLS AND ACCESSORIES. SEE PHOTO NO 3. SEE HVAC DEMOLITION NOTE 2 ON THIS DRAWING.
5. EXISTING FAN WILL REMAIN AS IS. SEE PHOTO NO 4.
6. EXISTING FAN WILL REMAIN AS IS. SEE PHOTO NO 5.
7. EXISTING DUCT WILL REMAIN AS IS. SEE PHOTO NO 4.



1 PHOTO
NTS



2 PHOTO
NTS



3 PHOTO
NTS



4 PHOTO
NTS



5 PHOTO
NTS

3/16" = 1'- 0"

4 0 4 8

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
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Revisions

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LICENSED PROFESSIONAL ENGINEER
SAID YASIR IBRAHIM
M 39357
MECHANICAL
STATE OF CALIFORNIA
5/14/2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

HVAC DEMOLITION ROOF PLAN - PHASE 2-B

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Date: MAY 2025
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Drawn by: G. NITHIYAN
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Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

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HVAC ABBREVIATIONS

A	AIR
AABC	ASSOCIATED AIR BALANCE COUNCIL
AD	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
AL	ALUMINUM
ALT	ALTITUDE
AMCA	AIR MOVEMENT AND CONTROL ASSOCIATION
AP	ACCESS PANEL
AR	ACID RESISTANT
ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ATC	AUTOMATIC TEMPERATURE CONTROL
AUTO	AUTOMATIC
AUX	AUXILIARY
AV	AUTOMATIC AIR RELEASE VENT
AVG	AVERAGE
B TO B	BACK TO BACK
BDD	BACKDRAFT DAMPER
BEL	BELOW
BHP	BRAKE HORSEPOWER
BI	BACKWARD INCLINE
BLDG	BUILDING
BMS	BUILDING MANAGEMENT SYSTEM
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
BOT	BOTTOM
BS	BIRD SCREEN
BTU	BRITISH THERMAL UNITS
C TO C	CENTER TO CENTER
CA	COMPRESSED AIR
CCW	COUNTER CLOCKWISE
CD	CONTROL DAMPER
CENT	CENTRIFUGAL
CFM	CUBIC FEET PER MINUTE
CGP	CHILLED WATER GLYCOL PUMP
CHIL	CHILLER
CHW	CHILLED WATER
CL	CENTER LINE
CLG	CEILING
CLR	CLEAR
CONC	CONCRETE
CONN	CONNECTION
COP	COEFFICIENT OF PERFORMANCE
CTR	CENTER
CU	COPPER/ CONDENSING UNIT
CV	VALVE FLOW COEFFICIENT
D	DRAIN
DB	DRY BULB
DDC	DIRECT DIGITAL CONTROL
DG	DOOR GRILLE
DIA	DIAMETER
DISC	DISCHARGE
DN	DOWN
DPS	DIFFERENTIAL PRESSURE SWITCH
DS	DISCONNECT SWITCH
DWG	DRAWING
DX	DIRECT EXPANSION COIL
EA	EACH
EAT	ENTERING AIR TEMPERATURE
ECM	ELECTRONICALLY COMMUTATED MOTOR
ED	EXHAUST DIFFUSER
EER	ENERGY EFFICIENCY RATIO
EF	EXHAUST FAN
ELEC	ELECTRICAL
EMERG	EMERGENCY
ENT	ENTERING
ESP	EXTERNAL STATIC PRESSURE
EVAP	EVAPORATOR
EWT	ENTERING WATER TEMPERATURE
EXP	EXPANSION TANK
F	FAHRENHEIT
FBV	FLOW BALANCE & SHUTOFF VALVE
FC	FLEXIBLE CONNECTION
FC	FORWARD CURVE
FD	FIRE DAMPER
FG	FLOOR GRILLE
FIN	FINISH
FL	FLOOR
FLA	FULL LOAD AMPS
FLG	FLANGE
FOB	FLAT ON BOTTOM
FOT	FLAT ON TOP
FPM	FEET PER MINUTE
FRP	FIBERGLASS REINFORCED PLASTIC
FS	FLOW SENSOR
FSD	FIRE AND SMOKE DAMPER
GA	GAUGE
GAL	GALVANIZED
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GS	GALVANIZED STEEL
H-O-A	HAND-OFF-AUTO
HG	HOT GAS
HP	HORSEPOWER
HR	HOUR
HV	HEATING AND VENTILATING UNIT
HW	HOT WATER

HVAC ABBREVIATIONS

HZ	HERTZ
ID	INSIDE DIAMETER
IEER	INTEGRATED ENERGY EFFICIENCY RATIO
IN	INCH
INS	INSULATE,INSULATION
INSTR	INSTRUMENT(ATION)
kW	KILOWATT
LAT	LEAVING AIR TEMPERATURE
LBS	POUNDS
LCP	LOCAL CONTROL PANEL
LD	LINEAR DIFFUSER
LIQ	LIQUID
LP	LOW PRESSURE
LV	LOUVER
LVG	LEAVING
LWT	LEAVING WATER TEMPERATURE
M	MOTOR
MATL	MATERIAL
MAX	MAXIMUM
MBH	THOUSAND BTU PER HOUR
MCA	MINIMUM CIRCUIT AMPACITY
MCC	MOTOR CONTROL CENTER
MFR	MANUFACTURER
MIN	MINIMUM
MISC	MISCELLANEOUS
MOCP	MAXIMUM OVERCURRENT PROTECTION
MT	MOISTURE TRANSMITTER
MTD	MOUNTED
MTG	MOUNTING
NC	NORMALLY CLOSED
NG	NATURAL GAS
NO	NORMALLY OPEN
NOM	NOMINAL
NPT	AMERICAN NATIONAL TAPER PIPE THREAD
NTS	NOT TO SCALE
OAT	OUTSIDE AIR TEMPERATURE
OBD	OPPOSED BLADE DAMPER
OC	ON CENTER
OD	OUTSIDE DIAMETER
ODP	OPEN DRIP PROOF
OPP	OPPOSITE
PACU	PACKAGED AIR CONDITIONING UNIT
PCD	PERFORATED CEILING DIFFUSER
PCF	POUNDS PER CUBIC FOOT
PD	PRESSURE DROP
PH	PHASE
PPM	PARTS PER MILLION
PRV	PRESSURE REGULATOR VALVE
PSI	POUNDS PER SQUARE INCH
PSIA	PSI ABSOLUTE
PSIG	PSI GAUGE
PVC	POLYVINYL CHLORIDE
R	REFRIGERANT
RG	RETURN GRILLE
RH	RELATIVE HUMIDITY
RM	ROOM
RPM	REVOLUTIONS PER MINUTE
SAD	SUPPLY AIR DIFFUSER
SEER	SEASONAL ENERGY EFFICIENCY RATIO
SF	SUPPLY FAN
SHT	SHEET
SM	SHEET METAL
SMACNA	SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION
SP	STATIC PRESSURE
SPEC	SPECIFICATION
SS	STAINLESS STEEL
ST	STEAM
STD	STANDARD
STL	STEEL
SUCT	SUCTION
TD	TEMPERATURE DIFFERENCE
TDH	TOTAL DISCHARGE HEAD
TEAO	TOTALLY ENCLOSED AIR OVER
TEFC	TOTALLY ENCLOSED FAN COOLED
TEMP	TEMPERATURE
TG	TRANSFER GRILLE
TS	TEMPERATURE SWITCH
TSP	TOTAL STATIC PRESSURE
TV	TURNING VANES
TXV	THERMAL EXPANSION VALVE
TYP	TYPICAL
U	HEAT TRANSFER COEFFICIENT
UL	UNDERWRITERS LABORATORY
V	VOLTAGE
VAP	VAPOR
VAV	VARIABLE AIR VOLUME
VD	VOLUME DAMPER
VEL	VELOCITY
VVT	VARIABLE VOLUME TERMINAL
W/	WITH
W/O	WITHOUT
WB	WET BULB
WG	WATER GAUGE
WG	WALL GRILLE
WMS	WIRE MESH SCREEN
WT	WEIGHT

DUCTWORK SYMBOLS

SINGLE LINE	DOUBLE LINE	DESCRIPTION
	20X12	FIRST DIMENSION DENOTES VIEW SHOWN; RECT. OR OVAL
	20X12 16X8	TRANSITION, 18" MIN. LENGTH, 15° MAX. EACH SIDE. ROUND OR RECT.
	20X12 16X8	SINGLE SIDE TRANSITION
	FOT OR FOB 20X12 16X8	TRANSITION FLAT ON TOP (FOT) OR FLAT ON BOTTOM (FOB)
	20X12 16"ø	RECT. TO ROUND TRANSITION
		MITERED ELBOW WITH TURNING VANES
		RADIUS ELBOW WITH TURNING VANES
		45° HEEL TAKE-OFF FITTING, RECT
		CONICAL OR FLARED SPIN-IN OR CONICAL TAP
18"ø	18"ø	ROUND DUCT. DIMENSION LISTED IS DUCT DIAMETER.
	D R	ROUND DUCT ELBOW; R/D=1.5MIN.
		90° STRAIGHT TEE FITTING
		90° CONICAL TEE FITTING
		45° LATERAL FITTING
		45° CONICAL LATERAL FITTING
		RECTANGULAR SUPPLY DUCT TURNING TOWARD
		RECTANGULAR SUPPLY DUCT TURNING AWAY
		RECTANGULAR EXHAUST DUCT TURNING TOWARD
		RECTANGULAR EXHAUST DUCT TURNING AWAY
		RECTANGULAR RETURN DUCT TURNING TOWARD
		RECTANGULAR RETURN DUCT TURNING AWAY
		ROUND SUPPLY DUCT TURNING TOWARD
		ROUND SUPPLY DUCT TURNING AWAY
		ROUND EXHAUST DUCT TURNING TOWARD
		ROUND EXHAUST DUCT TURNING AWAY
		ROUND RETURN DUCT TURNING TOWARD
		ROUND RETURN DUCT TURNING AWAY
AD	AD	ACCESS DOOR
	M	MANUAL BALANCING DAMPER/ VOLUME DAMPER

DUCTWORK SYMBOLS

SINGLE LINE	DOUBLE LINE	DESCRIPTION
M	M	MOTORIZED DAMPER
B	B	BACKDRAFT DAMPER
FD		FIRE DAMPER
SD		SMOKE DAMPER
SD/FD		COMBINATION FIRE-SMOKE DAMPER
FC		FLEXIBLE CONNECTOR (DUCT)
		FLEXIBLE DUCT
		CEILING DIFFUSER
	20X12	AIR DEVICE (SIDE MOUNTED)
		AIR DEVICE (BOTTOM MOUNTED)
		WIRE MESH SCREEN
	DG	DOOR GRILLE (TRANSFER AIR)
		DOOR UNDERCUT (TRANSFER AIR)
R OR D	R OR D	DUCT ELEVATION INCLINE RISE (R) OR DROP (D) IN DIRECTION OF AIR FLOW.
		AIRFLOW DIRECTION, SUPPLY
		AIRFLOW DIRECTION, RETURN OR EXHUST
		DUCT WORK TO BE DEMOLISHED
	POINT WHERE NEW CONSTRUCTION CONNECTS TO EXISTING CONSTRUCTION	
	POINT BETWEEN EXISTING CONSTRUCTION TO REMAIN AND EXISTING CONSTRUCTION TO BE DEMOLISHED	

GENERAL NOTES:

1. HVAC EQUIPMENT LOCATIONS, DUCTWORK, AND PIPING SYSTEM LAYOUTS ARE BASED ON EQUIPMENT SELECTED BY THE ENGINEER. IF THE CONTRACTOR PROPOSES TO FURNISH EQUIPMENT OF DIFFERENT SIZE, OR EQUIPMENT THAT REQUIRES AN ARRANGEMENT OR SPACE DIFFERING FROM THAT INDICATED ON THE DRAWINGS OR SPECIFIED, THE CONTRACTOR SHALL PREPARE AND SUBMIT TO THE ENGINEER FOR APPROVAL, DETAILED ARCHITECTURAL, STRUCTURAL, MECHANICAL, PLUMBING, INSTRUMENTATION, HVAC, AND ELECTRICAL DRAWINGS AND EQUIPMENT SPECIFICATION SHEETS. THE SUBMITTALS SHALL SHOW ALL NECESSARY CHANGES AND INDICATE ALL FEATURES OF THE EQUIPMENT THE CONTRACTOR PROPOSES. THE DRAWINGS SHALL INCLUDE BUT NOT BE LIMITED TO PLANS, SECTIONS, DETAILS, AND SCHEMATICS OF ALL APPURTENANCES REQUIRED. DEVIATIONS FROM THE EQUIPMENT SPECIFIED AND SHOWN ON THE CONSTRUCTION DRAWINGS AND IN THE SPECIFICATIONS SHALL BE CLEARLY INDICATED. CHANGES SHALL BE APPROVED BY THE ENGINEER PRIOR TO PROCEEDING WITH THE WORK AND SHALL BE MADE AT NO EXTRA COST TO THE OWNER. THE CONTRACTOR SHALL ASSUME THE COST OF, AND THE RESPONSIBILITY FOR SATISFACTORY ACCOMPLISHING ALL OF THE CHANGES AND THE FINAL OPERATION OF THE EQUIPMENT IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS.
2. EQUIPMENT PADS SIZES ARE APPROXIMATE. THE CONTRACTOR SHALL DETERMINE EXACT DIMENSIONS BASED ON THE EQUIPMENT IN THE APPROVED SHOP DRAWINGS. FLOOR MOUNTED EQUIPMENT SHALL BE SET ON CONCRETE HOUSEKEEPING PADS BASED ON STRUCTURAL DRAWING DETAILS.
3. HVAC PIPING AND DUCTWORK DRAWINGS DO NOT SHOW ALL DRAINS, VENTS, OFFSETS AND FITTINGS ETC. REQUIRED FOR THE COMPLETE SYSTEM. SUCH ITEMS SHALL BE PROVIDED AS CALLED FOR ON THE DETAILS AND IN THE SPECIFICATIONS. PROVIDE ALL FITTINGS, TRANSITIONS, DAMPERS, VALVES, AND OTHER DEVICES REQUIRED FOR COMPLETE WORKABLE INSTALLATION.
4. SMALL DIAMETER PIPING IS SHOWN APPROXIMATELY TO SCALE BUT NOT EVERY FITTING AND OFFSET IS SHOWN. SOME VALVES AND APPURTENANCES MAY BE OMITTED FOR THE SAKE OF CLARITY. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL SUCH ITEMS WHETHER SHOWN OR NOT SHOWN.
5. PROTECT ALL PIPING FROM DIRECT CONTACT WITH CORROSIVE MATERIAL (CONCRETE, MASONRY, OR CINDERS) AT ENCASEMENTS AND PENETRATIONS USING PIPE SLEEVE OR PIPE WRAPS AS SPECIFIED OR DETAILED.
6. UNLESS SPECIFIC REQUIREMENTS ARE SHOWN ON THE DRAWINGS ALL FLOOR SLAB AND WALL PENETRATIONS SHALL BE AS SHOWN ON THE DETAILS. ABOVE GROUND EXTERIOR WALL AND ROOF PENETRATIONS SHALL BE AS SHOWN ON THE ARCHITECTURAL DRAWINGS. ALTERNATE DETAILS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. THE ENGINEER'S APPROVAL SHALL BE RECEIVED PRIOR TO STARTING THE WORK.
7. ALL DUCTWORK SHALL BE INSTALLED PARALLEL OR PERPENDICULAR TO THE BUILDING WALLS AND FLOOR.
8. ALL PIPING SHALL BE INSTALLED PARALLEL OR PERPENDICULAR TO THE BUILDING WALLS AND FLOOR.
9. NOT ALL SUPPORTS ARE SHOWN ON THE DRAWINGS. UNLESS OTHERWISE DETAILED ON THE DRAWINGS ALL PIPE AND DUCT SUPPORTS SHALL BE DESIGNED, FURNISHED AND INSTALLED BY THE CONTRACTOR.
10. WHERE THE WORK IS A MODIFICATION OF EXISTING SYSTEMS OR STRUCTURES, THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONFIRMATION OF THE EXISTING DIMENSIONS, CONFIGURATION AND CONSTRUCTION OF EXISTING ELEMENTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH THE EXISTING ELEMENTS. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO BIDDING THE WORK. ANY DEVIATIONS FROM THE DRAWINGS MUST BE PRESENTED PRIOR TO BID SUBMISSION FOR CLARIFICATION.
11. CONTRACTOR IS RESPONSIBLE FOR REMOVAL OF ALL MISCELLANEOUS CONTROL WIRING, HANGERS, CONDUITS, FITTINGS AND OTHER ACCESSORIES ASSOCIATED WITH DEMOLITION WORK.
12. ALL WORK, ESPECIALLY BUILDING SERVICES AND UTILITY SHUTDOWNS, MUST BE COORDINATED AND SCHEDULED WITH THE OWNER PRIOR TO BEGINNING CONSTRUCTION.
13. THE CONTRACTOR SHALL REMOVE CONSTRUCTION DEBRIS AND ALL OTHER DEBRIS MADE DURING THE WORK THEY HAVE COMPLETED, AT THE END OF EACH WORK DAY.
14. THE CONTRACTOR SHALL REPAIR OR REPLACE ANY DAMAGED EQUIPMENT, CEILING, WALLS, ETC. WHICH HAVE BEEN DAMAGED BY THE WORK OF THIS PROJECT AT NO COST TO THE OWNER.
15. NOTED ELEVATIONS ARE GIVEN AS REFERENCE FOR THE INTENDED ROUTING OF SYSTEMS. THE CONTRACTOR SHALL COORDINATE THE EXACT ROUTING. ALL WORK SHALL BE INSTALLED WITH THE PROPER PITCH. COORDINATE WITH OTHER TRADES AND FIELD CONDITIONS TO AVOID INTERFERENCES.
16. COORDINATE ALL MOTOR SIZES, STARTERS, DISCONNECT SWITCHES, CONTROLS, ETC. WITH ELECTRICAL CONTRACTOR AND HVAC CONTROLS CONTRACTOR PRIOR TO THE RELEASE OF ANY EQUIPMENT.
17. ALL THERMOSTATS SHALL BE MOUNTED IN LINE WITH CENTERLINE OF LIGHT SWITCH AT 48" AFF UNLESS OTHERWISE NOTED. VERIFY MOUNTING HEIGHT IS 48" PRIOR TO INSTALLING COMPONENTS SYSTEMS. CONTRACTOR SHALL CALIBRATE ALL THERMOSTATS.
18. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
19. PROVIDE FIRE RATED DAMPERS AT ALL DUCT PENETRATIONS THROUGH FIRE RATED WALLS AND FLOORS. REFER TO ARCHITECTURAL DRAWINGS FOR LOCATION AND CONSTRUCTION OF FIRE RATED WALLS AND FLOORS.
20. PROVIDE FIRE RATED PIPE PENETRATIONS FOR PENETRATIONS THROUGH FIRE RATED WALLS AND FLOORS. REFER TO ARCHITECTURAL DRAWINGS FOR LOCATION AND CONSTRUCTION OF FIRE RATED WALLS AND FLOORS.
21. UNLESS OTHERWISE NOTED, MOUNT ALL DUCTWORK AND PIPING TIGHT TO THE STRUCTURE. MAINTAIN A MINIMUM 7'-0" CLEAR HEIGHT BELOW DUCTWORK, INCLUDING SUPPORTS AND INSULATION. COORDINATE INSTALLATION OF DUCTWORK WITH ALL OTHER NEW AND EXISTING EQUIPMENT, PIPING, CONDUIT, AND STRUCTURAL MEMBERS.
22. ALL CONTROL WIIRING SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE AND DIVISION 26 SPECIFICATIONS.

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LICENSED PROFESSIONAL ENGINEER
SAID TAAIR IBRAHIM
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MECHANICAL
STATE OF CALIFORNIA
5/14/2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

HVAC ABBREVATION, SYMBOLS AND GENERAL NOTES

Design by: S. IBRAHIM
Date: MAY 2025
Checked by: S. GOPIKUMAR
Date: MAY 2025
Drawn by: G. NITHIYAN
Date: MAY 2025
Checked by: S. IBRAHIM
Date: MAY 2025

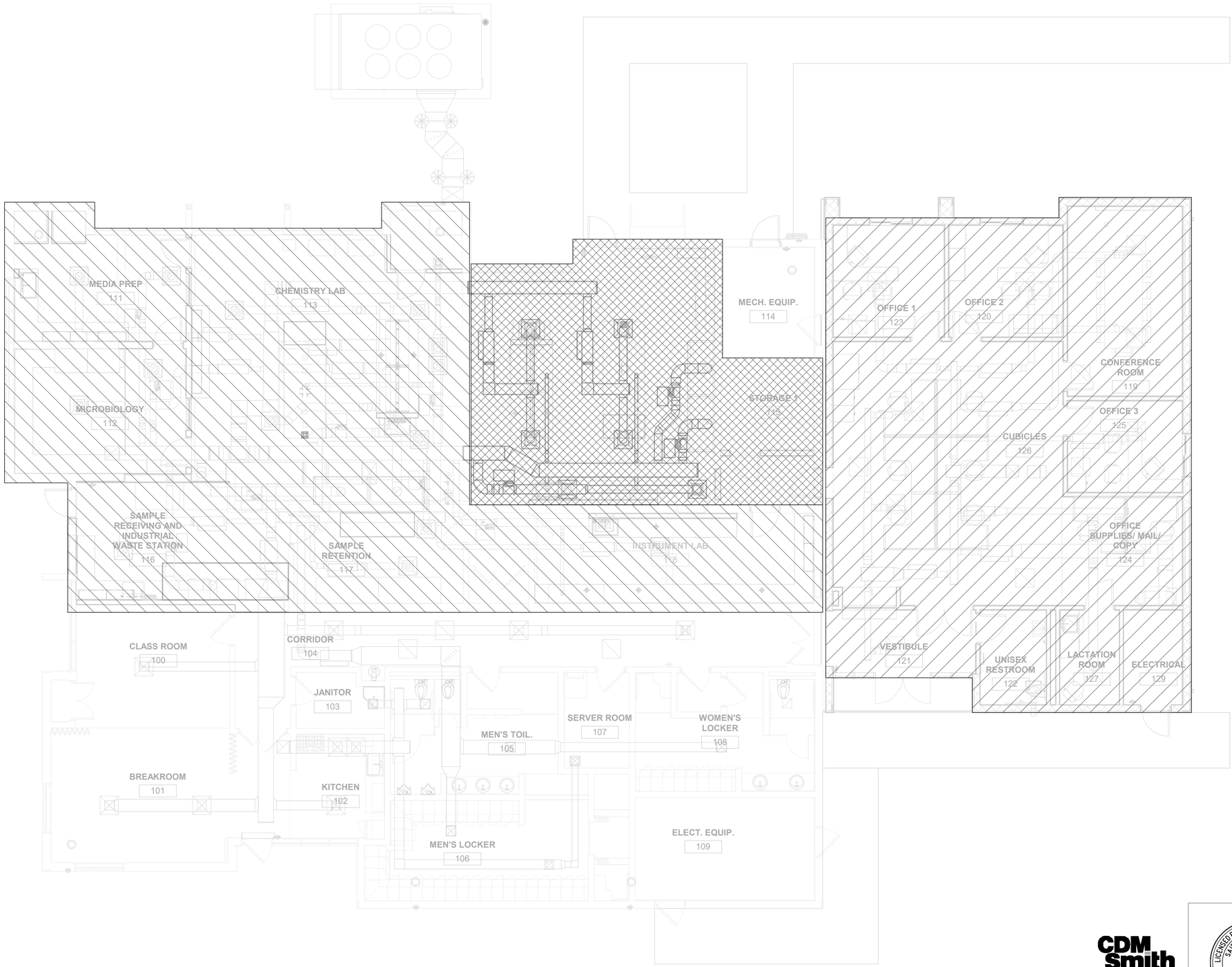
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

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M-1

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HVAC PLAN

3/16" = 1'-0"

3/16" = 1'- 0"

4 0 4 8

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LICENSED PROFESSIONAL ENGINEER — SAID TAHIR IBRAHIM — M 39357 — MECHANICAL — STATE OF CALIFORNIA

5/14/2025

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CITY OF REDLANDS
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JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

HVAC CONSTRUCTION PHASES

Design by: S. IBRAHIM
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Checked by: S. GOPIKUMAR
Date: MAY 2025
Drawn by: G. NITHIYAN
Date: MAY 2025
Checked by: S. IBRAHIM
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REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

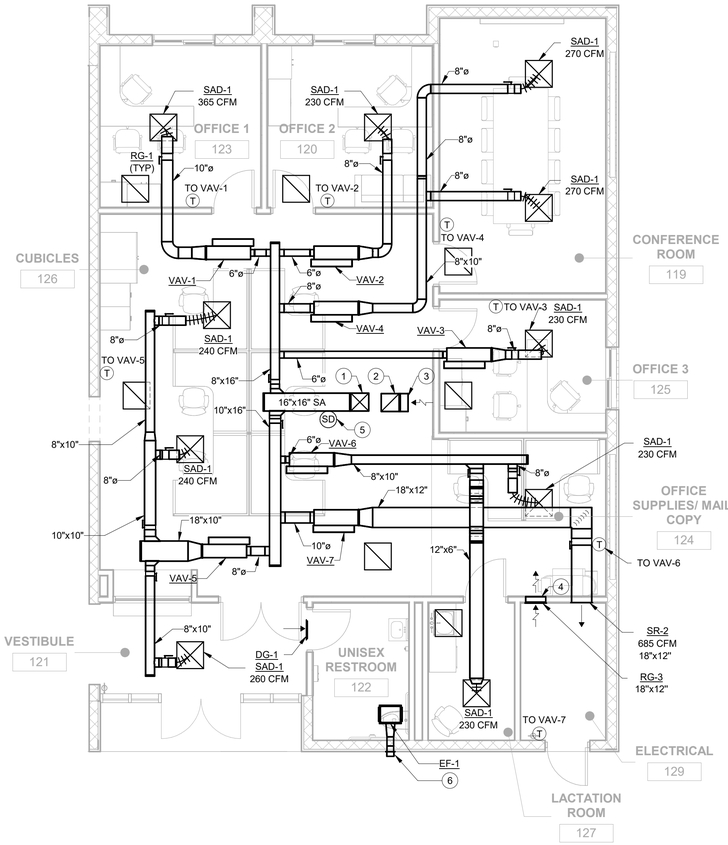
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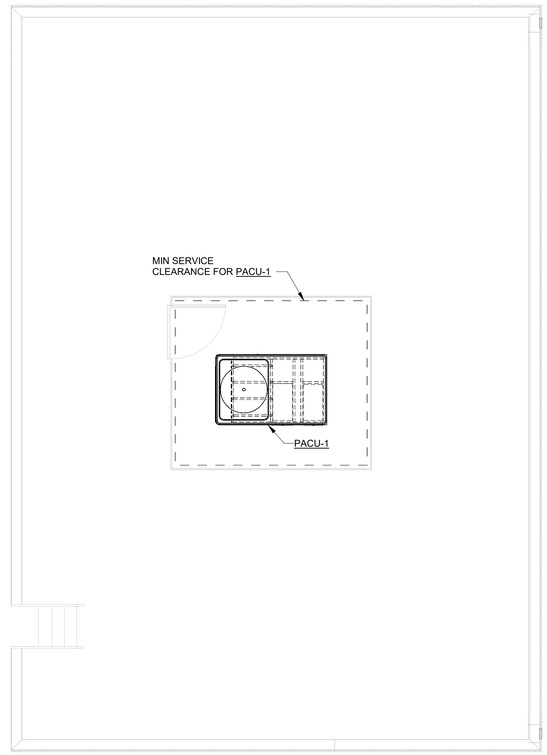
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HVAC FLOOR PLAN - PHASE 1

3/16" = 1'-0"



HVAC ROOF PLAN - PHASE 1

3/16" = 1'-0"

N

HVAC KEYNOTES:

1. 16"x16" SUPPLY AIR DUCT UP THROUGH ROOF TO ROOF MOUNTED HVAC UNIT PACU-1.
2. 16"x16" RETURN AIR DUCT UP THROUGH ROOF TO ROOF MOUNTED HVAC UNIT PACU-1.
3. 16"x16" OPEN-ENDED RETURN AIR DUCT ABOVE CEILING.
4. 18"x12" TRANSFER AIR WALL OPENING ABOVE CEILING.
5. PROVIDE AND INSTALL DUCT SMOKE DETECTOR. PACU-1 SHALL SHUT DOWN WHEN DUCT SMOKE DETECTOR IS ACTIVATED. COORDINATE WITH ELECTRICAL.
6. 6" EXHAUST AIR DUCT THROUGH WALL. CONNECT TO HOODED WALL CAP PROVIDED BY EXHAUST FAN MANUFACTURER.

3/16" = 1'- 0"
4 0 4 8

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

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5/14/2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

HVAC PLANS - PHASE 1

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Goutam K. Dobey, City Engineer, RCE 75646 DATE

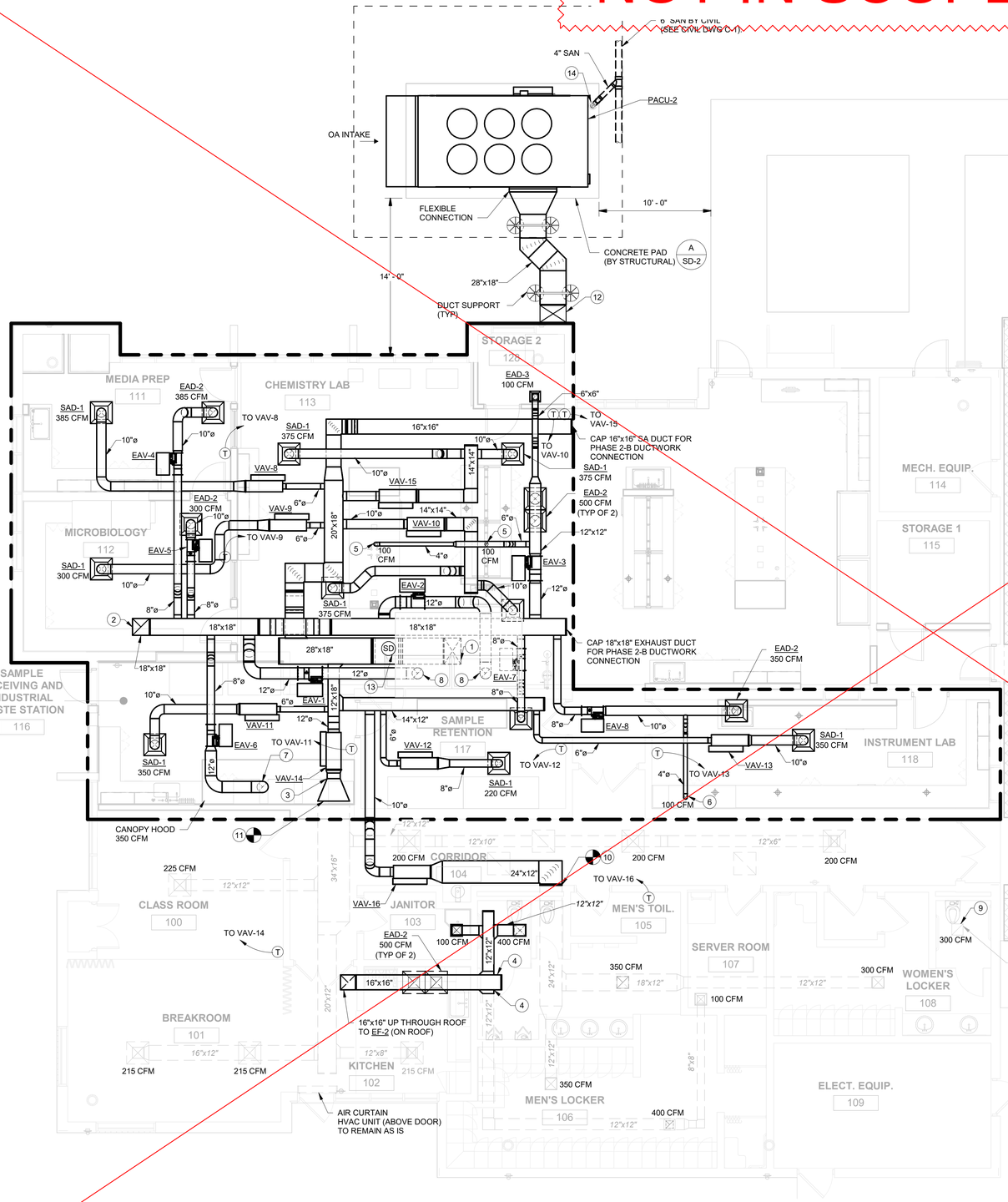
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NOT IN SCOPE- PHASE 2



HVAC FLOOR PLAN - PHASE 2-A

3/16" = 1'-0"

3/16" = 1'- 0"

4 0 4 8

N

HVAC NOTES - PHASE 2-A:

1. ALL DUCTWORK, HVAC EQUIPMENT AND AIR DEVICES (DIFFUSERS AND GRILLES) SHOWN WITH DASHED LINE TYPE ARE EXISTING.
2. ADJUST AND BALANCE ALL EXISTING SUPPLY AND EXHAUST DIFFUSERS TO NEW CFM VALUES SHOWN ON THIS DRAWING.
3. ALL NEW EXHAUST DUCTWORK SERVING THE LAB AREAS SHALL BE STAINLESS STEEL.
4. COORDINATE FINAL LOCATION OF POINT OF USE EXHAUST DUCT CONNECTIONS SHOWN ON THIS DRAWING (KEY NOTES NO 5 AND 6) WITH THE LOCATION OF EXHAUST SNORKLE AND LAB EQUIPMENT.
5. ALL EXPOSED DUCTWORK SHOWN ON THIS DRAWING SHALL BE DOUBLE WALL INSULATED TYPE.

HVAC KEYNOTES - PHASE 2-A:

1. 28"x18" SA DUCT UP THROUGH EXISTING ROOF OPENING TO NEW HVAC UNIT PACU-2.
2. 18"x18" EXHAUST DUCT UP THROUGH EXISTING ROOF TO NEW ROOF MOUNTED EXHAUST FAN EF-3.
3. CONNECT NEW SA DUCT FROM VAV-14 TO EXISTING DUCTWORK.
4. CONNECT EXISTING EXHAUST DUCTWORK TO NEW 16"x16" EXHAUST DUCT FROM NEW EXHAUST FAN EF-2.
5. 4" DIA POINT OF USE EXHAUST DUCT DOWN THROUGH CEILING TO SERVE LAB TABLE. BALANCE TO 100 CFM. PROVIDE WITH MANUAL SHUTOFF VALVE.
6. 4" DIA POINT OF USE EXHAUST DUCT DOWN THROUGH CEILING TO SERVE GCMS. BALANCE TO 100 CFM. PROVIDE WITH MANUAL SHUTOFF VALVE.
7. 12" DIA EXHAUST DUCT DOWN THROUGH CEILING AND CONNECT TO CANOPY HOOD. BALANCE CANOPY HOOD EXHAUST TO 350 CFM.
8. 12" DIA EXHAUST DUCT FROM EXHAUST AIR VALVE DOWN THROUGH CEILING AND CONNECT TO FUME HOOD EXHAUST DUCT CONNECTION.
9. ADJUST AND BALANCE EXISTING TOILET EXHAUST ON ROOF TO 300 CFM.
10. CONNECT NEW 24"X12" SUPPLY AIR DUCT TO EXISTING 24"X12" SUPPLY AIR DUCTWORK.
11. CONNECT EXISTING 34"X16" SUPPLY AIR DUCT TO VAV-14.
12. 28"X18" SUPPLY AIR DUCT FROM PACU-2 UP ALONG EXTERIOR WALL TO BUILDING ROOF. FOR CONTINUATION SEE HVAC DRAWING M-5.
13. PROVIDE AND INSTALL DUCT SMOKE DETECTOR. PACU-2 SHALL SHUT DOWN WHEN DUCT SMOKE DETECTOR IS ACTIVATED. COORDINATE WITH ELECTRICAL.
14. CONNECT 4" FLOOR DRAIN (STAINLESS STEEL) TO 6" SANITARY DRAIN. ROUTE CONDENSATE DRAIN PIPE FROM PACU-2 TO FLOOR DRAIN. PROVIDE 2" MIN AIR GAP BETWEEN CONDENSATE DRAIN PIPE DISCHARGE AND TOP OF FLOOR DRAIN. COORDINATE WITH CIVIL TRADES.

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

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5/14/2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

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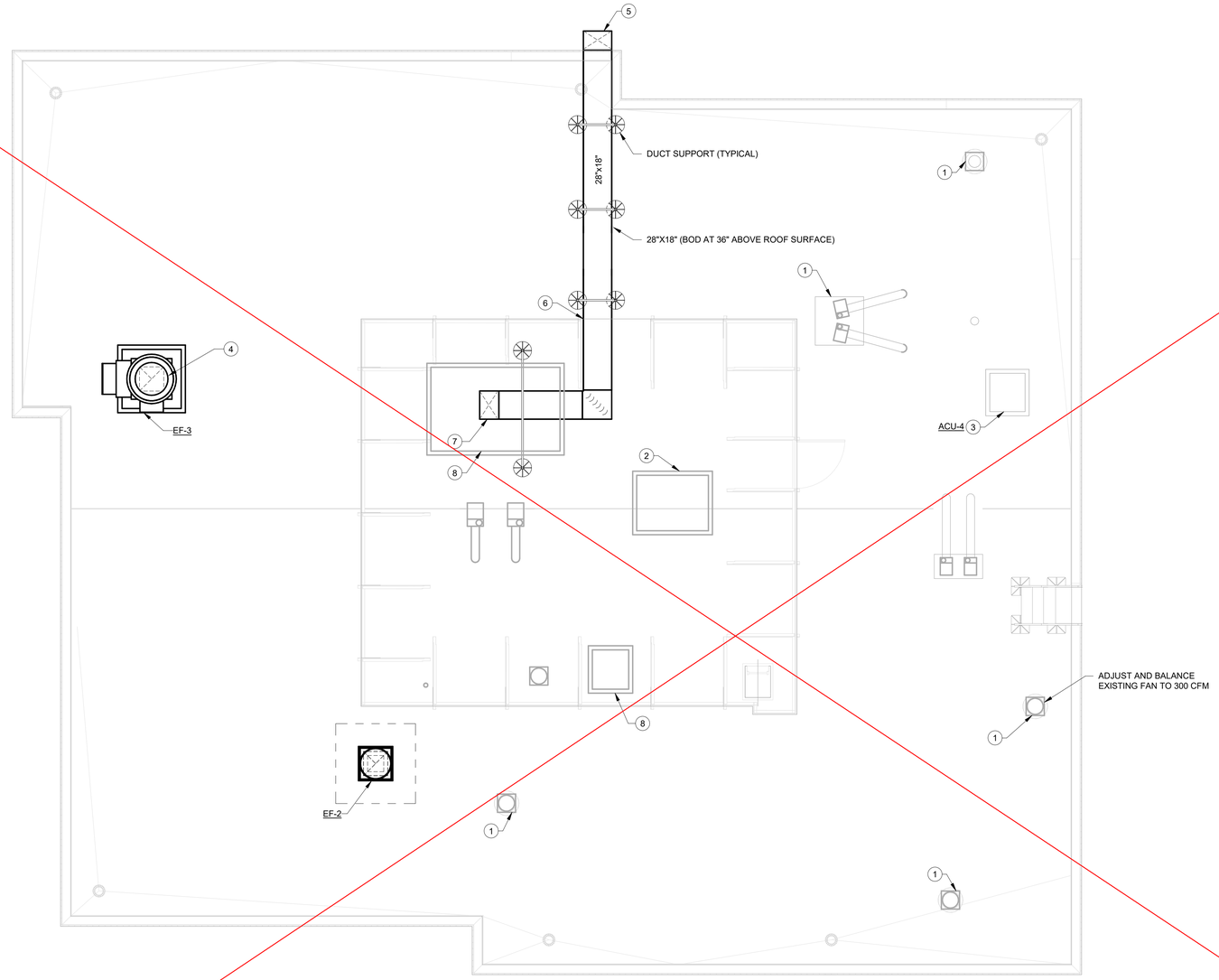
HVAC MODIFICATIONS FLOOR PLAN - PHASE 2-A

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Date:	MAY 2025	Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200	DATE
Checked by:	S. GOPIKUMAR	APPROVED BY:	6/11/2025
Date:	MAY 2025	Goutam K. Dobey, City Engineer, RCE 75646	DATE
Drawn by:	G. NITHIYAN	Sheet 79 of 126 Sheets	
Date:	MAY 2025	Scale Horiz. AS SHOWN	
Checked by:	S. IBRAHIM	Vert. AS SHOWN	M-4
Date:	MAY 2025		

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NOT IN SCOPE- PHASE 2



HVAC ROOF PLAN - PHASE 2-A

3/16" = 1'-0"

N

HVAC NOTES - PHASE 2-A:

1. ALL NEW EXHAUST DUCTWORK SERVING THE LAB AREAS SHALL BE STAINLESS STEEL.
2. ALL EXPOSED DUCTWORK SHOWN ON THIS DRAWING SHALL BE DOUBLE WALL INSULATED TYPE.

HVAC KEYNOTES - PHASE 2-A:

1. EXISTING HVAC EQUIPMENT TO REMAIN AS IS.
2. EXISTING HVAC UNIT NO 2 TO REMAIN AS IS (WILL BE REMOVED IN PHASE 2-B).
3. EXISTING HVAC UNIT NO 4 TO REMAIN AS IS (WILL BE REMOVED IN PHASE 2-B).
4. EXTEND LAB EXHAUST VERTICAL DUCT UP WITH TOP OF DUCT OPENING AT 12'-0" MIN FROM ROOF FINISHED SURFACE.
5. 28"X18" SUPPLY AIR DUCT FROM PACU-2 ALONG EXTRIOR WALL. FOR CONTINUATION SEE HVAC DRAWING M-4.
6. EXISTING SCREEN WALL PANEL TO BE REMOVED TO ALLOW FOR INSTALLATION OF NEW DUCT. COORDINATE WITH ARCH AND STRUCTURAL TRADES.
7. 28"X18" SUPPLY AIR DUCT FROM PACU-2 DOWN THROUGH METAL PANEL COVERING EXISTING ROOF CURB OPENING. FOR CONTINUATION SEE HVAC DRAWING M-4. SEAL ALL AROUND DUCT PENETRATION THROUGH PANEL AIR TIGHT.
8. EXISTING ROOF CURB CAPPED AND SEALED WITH NEW DOUBLE WALL INSULATED METAL PANEL. SEE HVAC DEMOLITION DRAWINGS.

3/16" = 1'- 0"

4 0 4 8

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED PROFESSIONAL ENGINEER — SAID YASIR IBRAHIM — M 39357 — MECHANICAL — STATE OF CALIFORNIA

5/14/2025

CITY OF REDLANDS

Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

HVAC MODIFICATIONS ROOF PLAN - PHASE 2-A

Design by: S. IBRAHIM
Date: MAY 2025
Checked by: S. GOPIKUMAR
Date: MAY 2025
Drawn by: G. NITHIYAN
Date: MAY 2025
Checked by: S. IBRAHIM
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

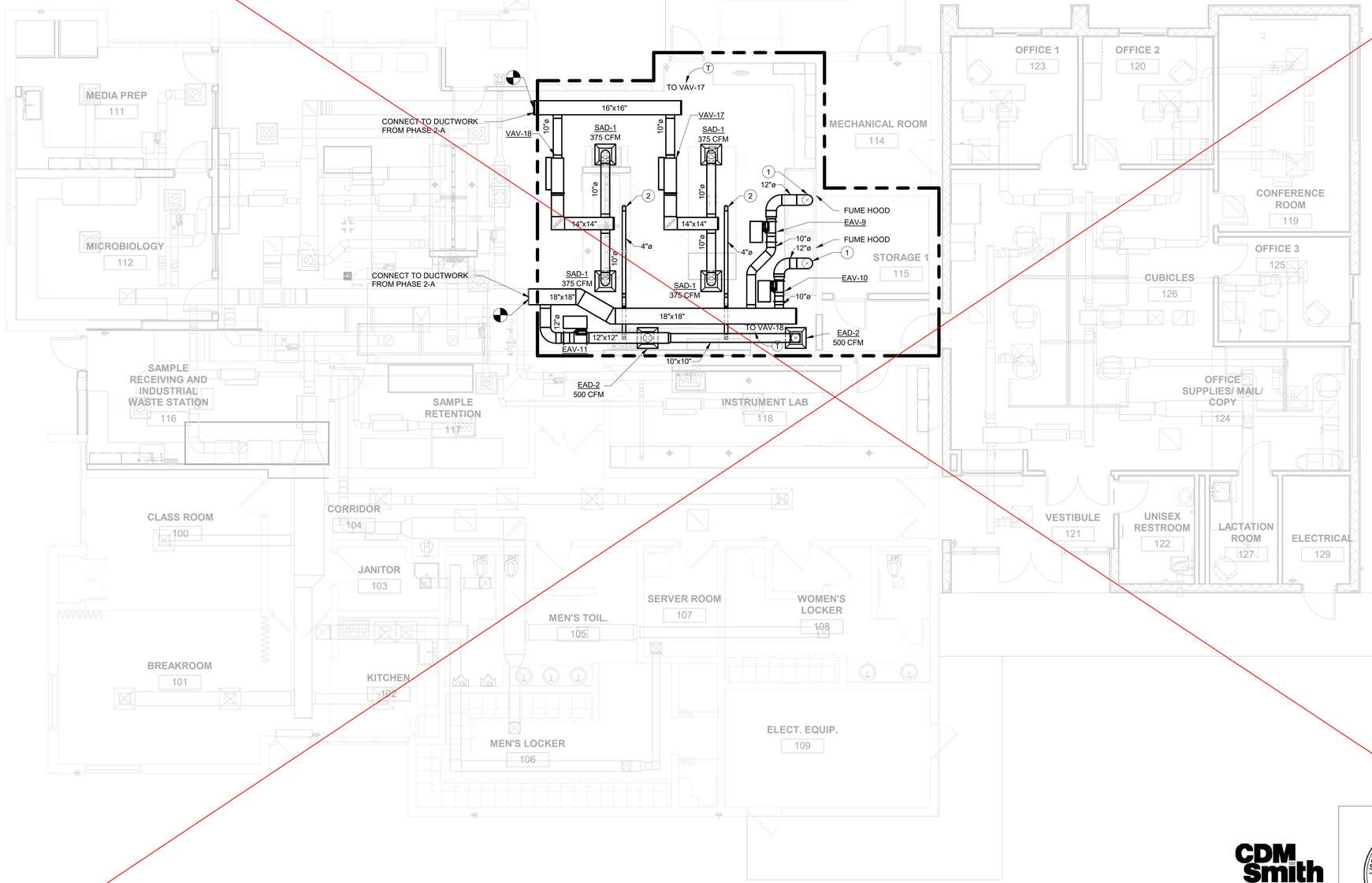
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NOT IN SCOPE- PHASE 2



HVAC NOTES - PHASE 2-B:

1. ALL NEW EXHAUST DUCTWORK SERVING THE LAB AREAS SHALL BE STAINLESS STEEL.
2. COORDINATE FINAL LOCATION OF POINT OF USE EXHAUST DUCT CONNECTIONS SHOWN ON THIS DRAWING (KEY NOTE NO 2) WITH THE LOCATION OF EXHAUST SNORKLE AND LAB EQUIPMENT.

HVAC KEYNOTES - PHASE 2-B:

(1) 12" DIA EXHAUST DUCT FROM EXHAUST AIR VALVE DOWN THROUGH CEILING AND CONNECT TO FUME HOOD EXHAUST DUCT CONNECTION.

(2) 4" DIA POINT OF USE EXHAUST DUCT DOWN THROUGH CEILING TO SERVE LAB TABLE, BALANCE TO 100 CFM. PROVIDE WITH MANUAL SHUTOFF VALVE.

HVAC FLOOR PLAN - PHASE 2-B

3/16" = 1'-0"

3/16" = 1'- 0"

4 0 4 8

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

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PROJECT No. 521028

HVAC MODIFICATIONS FLOOR PLAN - PHASE 2-B

Design by: S. IBRAHIM
Date: MAY 2025
Checked by: S. GOPIKUMAR
Date: MAY 2025
Drawn by: G. NITHIYAN
Date: MAY 2025
Checked by: S. IBRAHIM
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

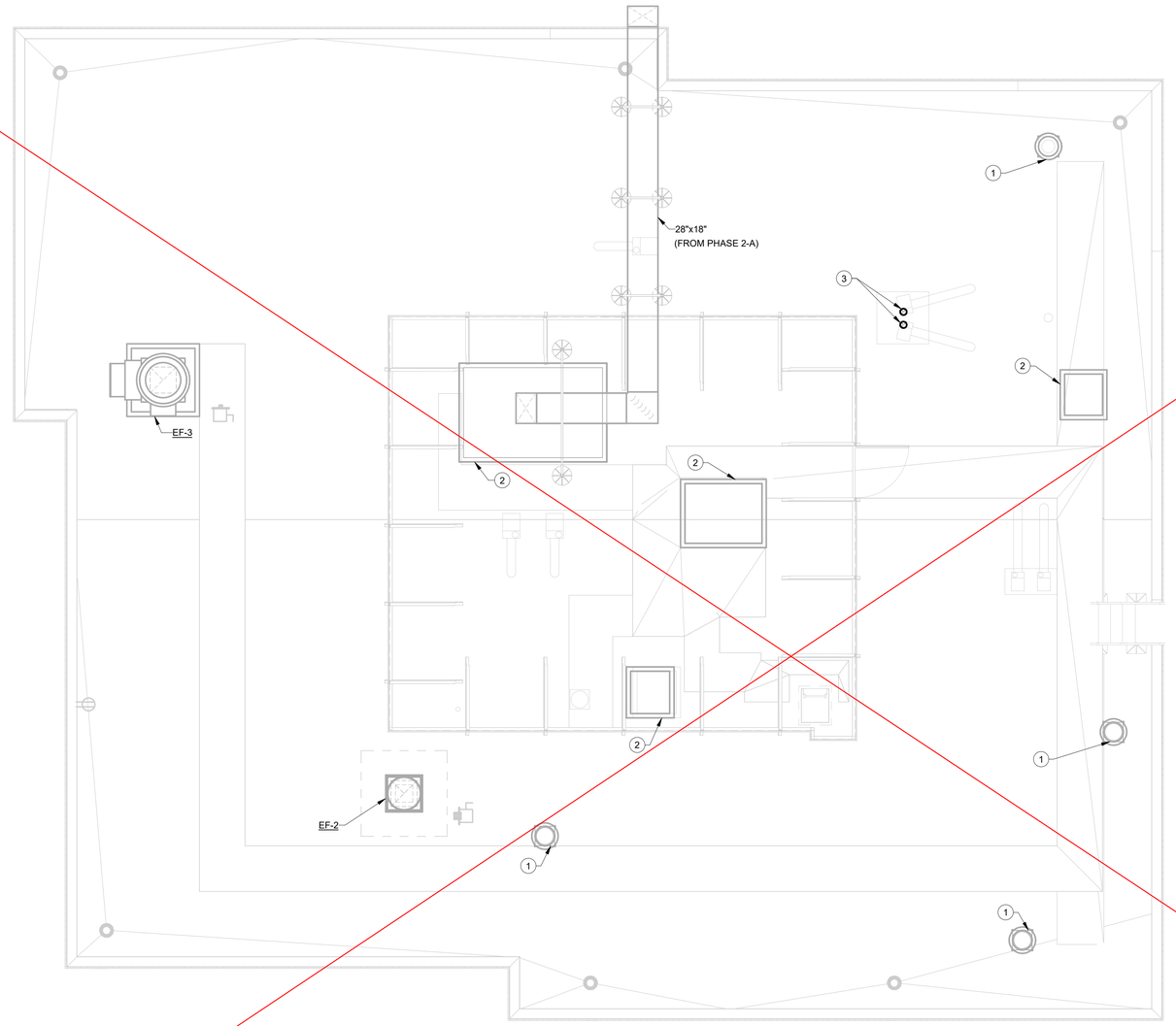
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NOT IN SCOPE- PHASE 2



HVAC ROOF PLAN - PHASE 2-B
3/16" = 1'-0"

N

HVAC NOTES - PHASE 2-B:

1. ALL NEW EXHAUST DUCTWORK SERVING THE LAB AREAS SHALL BE STAINLESS STEEL.

HVAC KEYNOTES - PHASE 2-B:

1. EXISTING HVAC EQUIPMENT REMAINING AS IS.
2. EXISTING ROOF CURB CAPPED AND SEALED WITH NEW DOUBLE WALL INSULATED METAL PANEL. SEE HVAC DEMOLITION DRAWINGS.
3. CAP EXISTING ROUND DUCT ROOF OPENING.

3/16" = 1'- 0"
4 0 4 8

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
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JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

HVAC MODIFICATIONS ROOF PLAN - PHASE 2-B

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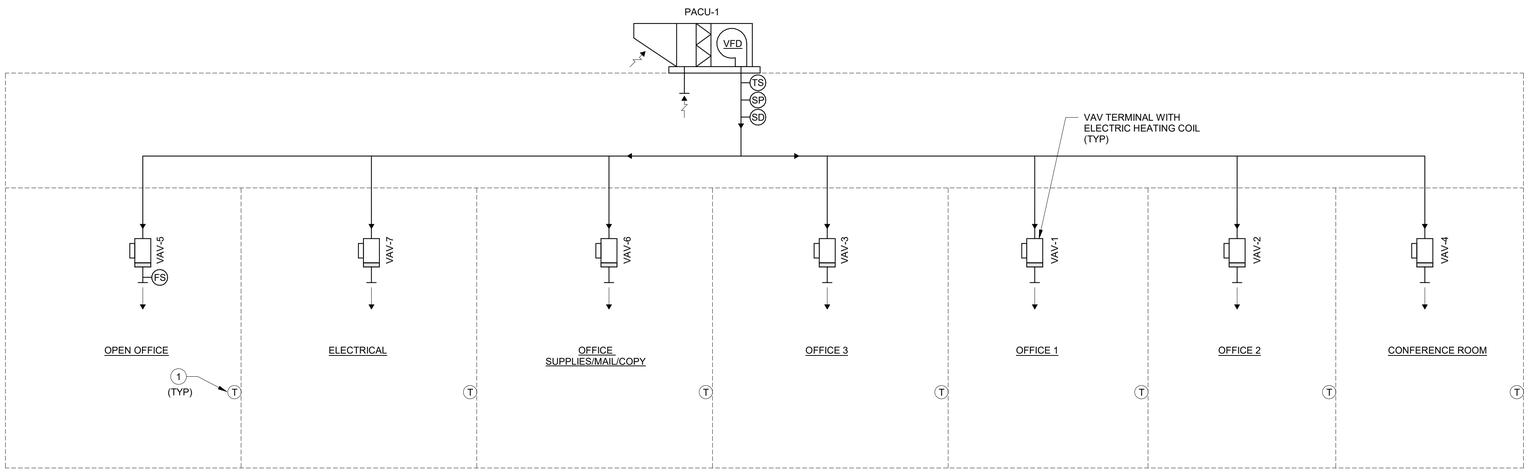
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Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
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Goutam K. Dobey, City Engineer, RCE 75646 DATE

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NEW BUILDING ADDITION HVAC AIRFLOW DIAGRAM

NTS

NEW BUILDING HVAC SYSTEM CONTROL SEQUENCE OF OPERATIONS:

GENERAL NOTES:

1. PROVIDED WITH A DEDICATED DIRECT DIGITAL CONTROLLER (DDC) TO MONITOR AND CONTROL THE OPERATIONS OF THE NEW HVAC SYSTEM SERVING THE NEW BUILDING ADDITION ACCORDING TO THE CONTROL SEQUENCE OF OPERATIONS SHOWN ON THIS DRAWING.
2. ALL FIELD CONTROL WIRING AND CONDUITS BETWEEN HVAC EQUIPMENT, SENSORS, ACTUATORS, VAV TERMINALS, DUCT SMOKE DETECTORS AND THE DDC CONTROLLER ARE PROVIDED AND INSTALLED BY THE HVAC CONTROLS CONTRACTOR.
3. HVAC UNIT PACU-1 SHALL BE INTERLOCKED TO SHUT DOWN WHEN DUCT SMOKE DETECTOR (INSTALLED IN PACU-1 SUPPLY AIR DUCTWORK) IS ACTIVATED.

HVAC UNIT PACU-1 CONFIGURATION:

1. OUTSIDE AIR, RETURN AIR AND RELIEF AIR DAMPERS.
2. FILTERS (MERV 8 AND MERV 13).
3. DX COOLING/HEATING COIL (HEAT PUMP).
4. SUPPLY FAN WITH VARIABLE FREQUENCY DRIVE (VFD).

NEW BUIILDING HVAC SYSTEM CONTROL SEQUENCE OF OPERATION:

1. PACKAGED AIR CONDITIONING UNIT PACU-1 SHALL RUN UNDER MANUFACTURER PROVIDED TEMPERATURE CONTROLLER TO MAINTAIN SUPPLY AIR DUCTS DISCHARGE AIR TEMPERATURE AT 55 DEG F (ADJUSTABLE).
2. SUPPLY AIR VOLUME CONTROL: PACU-1 SUPPLY FAN VFD WILL CONTROL SUPPLY FAN SPEED TO MAINTAIN SUPPLY AIR DUCT STATIC PRESSURE SETPOINT AS MEASURED BY AN IN-DUCT STATIC PRESSURE SENSOR LOCATED DOWNSTREAM OF THE SUPPLY FAN.
3. VAV TERMINAL CONTROL: SPACE TEMPERATURE SENSOR SHALL MODULATE VAV TERMINAL VOLUME CONTROL DAMPER TO MAINTAIN SPACE TEMPERATURE SETPOINT OF 75 DEG F (ADJUSTABLE) DURING COOLING AND 70 DEG F (ADJUSTABLE) DURING HEATING. IF DAMPER IS AT MINIMUM POSITION AND SPACE TEMPERATURE IS BELOW SETPOINT, ELECTRIC HEATING COIL STAGES SHALL ACTIVATE TO MAINTAIN SPACE TEMPERATURE SETPOINT. PROOF OF AIRFLOW VIA DISCHARGE AIRFLOW SWITCH SHALL BE ESTABLISHED BEFORE THE ELECRIC HEATING COIL IS ACTIVATED.
4. UNISEX ROOM EXHAUST FAN EF-1 CONTROL: EXHAUST FAN EF-1 SHALL RUN CONTINUOUSLY DURING OCCUPIED HOURS AS SCHEDULED BY THE DDC CONTROLLER.

HVAC KEYNOTES:

(1) INDOOR SPACE TEMPERATURE SENSOR WITH SUMMER SET POINT OF 75 °F (±2°F) AND WINTER SET POINT OF 70 °F (±2°F) TO CONTROL THE OPERATION OF ASSOCIATED VAV TERMINAL.

LEGEND:

(T) SPACE TEMPERATURE SENSOR/THERMOSTAT.

(SP) DUCT STATIC PRESSURE SENSOR.

(TS) DUCT TEMPERATURE SENSOR.

(SD) DUCT SMOKE DETECTOR.

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LICENSED PROFESSIONAL ENGINEER
SAID YASIR IBRAHIM
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STATE OF CALIFORNIA
5/14/2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

HVAC FLOW DIAGRAMS 1

Design by: S. IBRAHIM
Date: MAY 2025
Checked by: S. GOPIKUMAR
Date: MAY 2025
Drawn by: G. NITHIYAN
Date: MAY 2025
Checked by: S. IBRAHIM
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

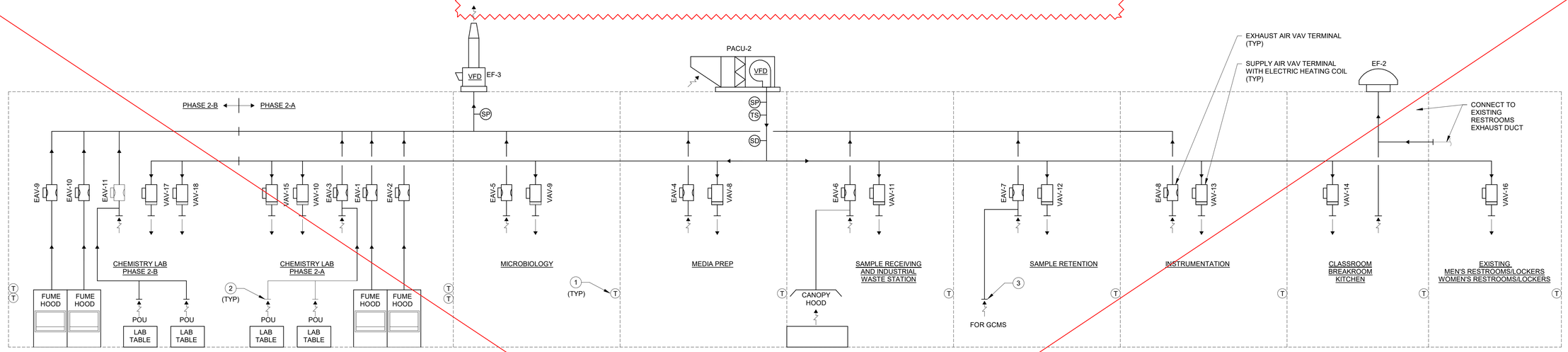
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NOT IN SCOPE- PHASE 2



LAB AREA HVAC AIRFLOW DIAGRAM

NTS

LAB BUILDING HVAC SYSTEM CONTROL SEQUENCE OF OPERATIONS:

GENERAL NOTES:

1. PROVIDED WITH A DEDICATED DIRECT DIGITAL CONTROLLER (DDC) TO MONITOR AND CONTROL THE OPERATIONS OF THE NEW HVAC SYSTEM SERVING THE LAB BUILDING ACCORDING TO THE CONTROL SEQUENCE OF OPERATIONS SHOWN ON THIS DRAWING.
2. ALL FIELD CONTROL WIRING AND CONDUITS BETWEEN HVAC EQUIPMENT, SENSORS, ACTUATORS, VAV TERMINALS, EAV TERMINALS, DUCT SMOKE DETECTORS AND THE DDC CONTROLLER ARE PROVIDED AND INSTALLED BY THE HVAC CONTROLS CONTRACTOR.
3. HVAC UNIT PACU-2 SHALL BE INTERLOCKED TO SHUT DOWN WHEN DUCT SMOKE DETECTOR (INSTALLED IN PACU-2 SUPPLY AIR DUCTWORK) IS ACTIVATED.

HVAC UNIT PACU-2 CONFIGURATION:

1. 100% OUTSIDE AIR.
2. FILTERS (MERV 8 AND MERV 13).
3. DX COOLING/HEATING COIL (HEAT PUMP).
4. SUPPLY FAN WITH VARIABLE FREQUENCY DRIVE (VFD).

LAB BUIILDING HVAC SYSTEM CONTROL SEQUENCE OF OPERATION:

1. PACKAGED AIR CONDITIONING UNIT PACU-2 SHALL RUN UNDER MANUFACTURER PROVIDED TEMPERATURE CONTROLLER TO MAINTAIN SUPPLY AIR DUCTS DISCHARGE AIR TEMPERATURE AT 55 DEG F (ADJUSTABLE).
2. LAB EXHAUST FAN EF-3 SHALL BE ENABLED TO START BY THE DDC CONTROLLER WHEN PACU-2 IS ACTIVATED. PROOF OF PACU-2 RUNNING SHOULD BE ESTABLISHED BEFORE EF-3 IS ENABLED TO START.
3. SUPPLY AIR VOLUME CONTROL: PACU-2 SUPPLY FAN VFD WILL CONTROL SUPPLY FAN SPEED TO MAINTAIN SUPPLY AIR DUCT STATIC PRESSURE SETPOINT AS MEASURED BY AN IN-DUCT STATIC PRESSURE SENSOR LOCATED DOWNSTREAM OF THE SUPPLY FAN.
4. EXHAUST AIR VOLUME CONTROL: EXHAUST FAN EF-3 VFD WILL CONTROL EXHAUST FAN SPEED TO MAINTAIN EXHAUST AIR DUCT STATIC PRESSURE SETPOINT AS MEASURED BY AN IN-DUCT STATIC PRESSURE SENSOR LOCATED UPSTREAM OF THE EXHAUST FAN.
5. VAV TERMINAL CONTROL-SUPPLY AIR: SPACE TEMPERATURE SENSOR SHALL MODULATE VAV TERMINAL VOLUME CONTROL DAMPER TO MAINTAIN SPACE TEMPERATURE SETPOINT OF 75 DEG F (ADJUSTABLE) DURING COOLING AND 70 DEG F (ADJUSTABLE) DURING HEATING. IF DAMPER IS AT MINIMUM POSITION AND SPACE TEMPERATURE IS BELOW SETPOINT, ELECTRIC HEATING COIL STAGES SHALL ACTIVATE TO MAINTAIN SPACE TEMPERATURE SETPOINT. PROOF OF AIRFLOW VIA DISCHARGE AIRFLOW SWITCH SHALL BE ESTABLISHED BEFORE THE ELECRIC HEATING COIL IS ACTIVATED.
6. EAV TERMINAL CONTROL-EXHAUST AIR: FOR EAV TERMINALS SERVING INDIVIDUAL ROOMS, THE EAV TERMINAL CONTROLLER SHALL MODULATE EAV TERMINAL VOLUME DAMPER TO MAINTAIN A FIXED DIFFERENTIAL FLOW (CFM) BETWEEN THE EAV TERMINAL AND ASSOCIATED SUPPLY AIR VAV TERMINAL SERVNG THE SAME SPACE. THIS SEQUENCE DOES NOT APPLY TO EAV TERMINALS SERVING INDIVIDUAL FUME HOODS.
7. TOILETS AND KITCHEN AREA EXHAUST FAN EF-2 CONTROL: EXHAUST FAN EF-2 SHALL RUN CONTINUOUSLY DURING OCCUPIED HOURS AS SCHEDULED BY THE DDC CONTROLLER. VAV TERMINALS VAV-14 AND VAV-16 SHALL RUN AS CONSTANT VOLUME TERMINALS.
8. LAB FUME HOOD EXHAUST CONTROL: EACH FUME HOOD EXHAUST IS CONNECTED TO A DEDICATED EXHAUST AIR VAV TERMINAL. EAV TERMINAL CONTROLLER SHALL MODULATE EAV TERMINAL VOLUME CONTROL DAMPER TO MAINTAIN MAKEUP AIR VELOCITY THROUGH FUME HOOD SASH OPENING AT 100 FT/MIN.

HVAC KEYNOTES:

1. INDOOR SPACE TEMPERATURE SENSOR WITH SUMMER SET POINT OF 75 °F (±2°F) AND WINTER SET POINT OF 70 °F (±2°F) TO CONTROL THE OPERATION OF ASSOCIATED VAV TERMINAL.
2. POINT OF USE (POU) EXHAUST DUCT CONNECTION BELOW CEILING FOR LAB TABLE USE.
3. POINT OF USE (POU) EXHAUST DUCT CONNECTION BELOW CEILING FOR GCMS.

LEGEND:

- (T) SPACE TEMPERATURE SENSOR/THERMOSTAT.
- (SP) DUCT STATIC PRESSURE SENSOR.
- (TS) DUCT TEMPERATURE SENSOR.
- (SD) DUCT SMOKE DETECTOR.

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5/14/2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

HVAC FLOW DIAGRAMS 2

Design by: S. IBRAHIM
Date: MAY 2025
Checked by: S. GOPIKUMAR
Date: MAY 2025
Drawn by: G. NITHIYAN
Date: MAY 2025
Checked by: S. IBRAHIM
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

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Goutam K. Dobey, City Engineer, RCE 75646 DATE

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AIR HANDLING UNIT SCHEDULE (HEAT PUMP)

TAG NO.	AREA SERVED	SUPPLY FAN				DX COOLING COIL							NO OF COMPRESSORS	MIN. SYSTEM IEER	MAX. WEIGHT (LBS)	BASED ON		ELECTRICAL		FILTERS	NOTES
		SA CFM	MIN. OA CFM	ESP (IN. WG)	VOLUME CONTROL	EAT (DB/WB) °F	LAT (DB/WB) °F	MAX. FACE VELOCITY FPM	SENSIBILE COOLING CAPACITY (MBH)	TOTAL COOLING CAPACITY (MBH)	HEATING CAPACITY (MBH)	REFRIGERANT				MANUFACTURER	MODEL	VOLT/PH/HZ	MCA/MOCP		
PACU-1	NEW ADMINISTRATION BUILDING	3000	450	2.0	VFD	82/65	55/54	500	77	88	50	R454B	2	17.5	1200	TRANE	WHK102A	460/3/60	27/35	SEE NOTES	1,2,4,5,6,7
PACU-2	EXISTING LAB BUILDING	7000	7000	2.0	VFD	110/76	52/50	500	412	565	115	R454B	2	12.2	7000	TRANE	OANE 540	460/3/60	105/110	SEE NOTES	1,2,3,4,5,7,8

NOTES:

1. PROVIDE UNIT WITH 2 INCH MERV 8 AND 2 INCH MERV 13 FILTERS SECTION.
2. PROVIDE UNIT WITH SINGLE POINT POWER CONNECTION AND FUSED DISCONNECT SWITCH.
3. PROVIDE UNIT WITH LOW AMBIENT KIT DOWN TO 20 DEG F.
4. EXTERNAL STATIC PRESSURE (ESP) DOES NOT INCLUDE FILTERS.
5. PROVIDE SUPPLY FAN VARIABLE FREQUENCY DRIVE (VFD) INSTALLED IN UNIT.
6. PROVIDE WITH COMPARATIVE ENTHALPY ECONOMIZER.
7. EQUIPMENT SELECTION IS BASED ON MAX AMBIENT TEMPERATURE OF 110 DEG F.
8. PROVIDE WITH NON-FUSED DISCONNECT SWITCH .

FAN SCHEDULE

TAG NO.	AREA SERVED	FAN TYPE	AIRFLOW (CFM)	ESP (IN. WG)	MOTOR HP	MOTOR FLA	V/PH/HZ	MATERIAL	MANUFACTURER	MODEL	WEIGHT (lb)	NOTES
EF-1	ADMIN BUILDING UNISEX ROOM	CEILING MOUNTED	125	0.25	N/A	0.5	115/1/60	ALUMINUM	GREENHECK	SPA-A-200	-	1,3
EF-2	RESTROOMS/BREAKROOM AREA	ROOF MOUNTED	2000	0.5	3/4	NA	115/1/60	ALUMINUM	GREENHECK	G-130-VG	100	2,3,4
EF-3	LAB BUILDING	HIGH PLUME DILUTION LABORATORY EXHAUST	7205	3.0	10	NA	460/3/60	STEEL	GREENHECK	VK-MD-18	1800	5,6

NOTES:

1. PROVIDE WITH ALUMINUM GRILLE, HOODED WALL CAP ANS SOLID FAN SPEED CONTROLLER.
2. PROVIDE WITH ALUMINUM BIRD SCREEN.
3. PROVIDE WITH INTEGRAL BACKDRAFT DAMPER.
4. PROVIDE WITH EC MOTOR AND SPEED ADJUSTMENT DAIL ON MOTOR FOR BALANCING (GREENHECK VARI-GREEN CONTROLL OR EQUAL).
5. PROVIDE WITH VARIABLE FREQUENCY DRIVE. COORDINATE LOCATION OF FAN VFD WITH ELECTRICAL TRADES.
6. PROVIDE WITH FACTORY APPLIED CORROSION RESISTANCE COATING THAT CAN WITHSTAND 4000 HOURS OF SALT SPRAY TEST ACCORDING TO ASTM B117. SEE SPECIFICATIONS SECTION 233423.

VAV BOX SCHEDULE

TAG NO.	BUILDING	AREA SERVED	INLET SIZE (INCH)	VAV BOX AIR FLOW (CFM)				MAX NC	ELECTRIC HEATING COIL				MANUFACTURER	MODEL	NOTES
				MIN FLOW	MAX FLOW	DESIGN FLOW (COOLING)	MIN STOP		CAPACITY (kW)	EAT DB (°F)	LAT DB (°F)	V/PHASE			
VAV-1	ADMINISTRATION BUILDING	OFFICE 1	6	105	500	365	50%	30	2	60	80	208/3	TITUS	DESV	1,2
VAV-2	ADMINISTRATION BUILDING	OFFICE 2	6	105	500	230	50%	30	1.5	60	80	208/3	TITUS	DESV	1,2
VAV-3	ADMINISTRATION BUILDING	OFFICE 3	6	105	500	230	50%	30	1.5	60	80	208/3	TITUS	DESV	1,2
VAV-4	ADMINISTRATION BUILDING	CONFERENCE ROOM	8	190	900	540	50%	30	4	60	80	208/3	TITUS	DESV	1,2
VAV-5	ADMINISTRATION BUILDING	OPEN OFFICE	8	190	900	740	50%	30	5	60	80	208/3	TITUS	DESV	1,2
VAV-6	ADMINISTRATION BUILDING	MAIL/COPY AREA	6	105	500	400	50%	30	2.5	60	80	208/3	TITUS	DESV	1,2
VAV-7	ADMINISTRATION BUILDING	ELECTRICAL ROOM	10	300	1400	685	50%	30	0.5	60	80	208/3	TITUS	DESV	1,2
VAV-8	LAB BUILDING - PHASE 2-A	MEDIA PREP 101	6	105	500	385	50%	30	3	60	80	208/3	TITUS	DESV	1,2
VAV-9	LAB BUILDING - PHASE 2-A	MICROBIOLOGY 102	6	105	500	300	50%	30	2	60	80	208/3	TITUS	DESV	1,2
VAV-10	LAB BUILDING - PHASE 2-A	CHEMISTRY LAB 103	10	300	1400	750	50%	30	5	60	80	208/3	TITUS	DESV	1,2
VAV-11	LAB BUILDING - PHASE 2-A	SAMPLE RECEIVING AND INDUSTRIAL WASTE STATION	6	105	500	350	50%	30	1.5	60	80	208/3	TITUS	DESV	1,2
VAV-12	LAB BUILDING - PHASE 2-A	SAMPLE RETENTION 107	6	105	500	220	50%	30	0.5	60	80	208/3	TITUS	DESV	1,2
VAV-13	LAB BUILDING - PHASE 2-A	INSTRUMENT LAB 109	6	105	500	350	50%	30	0.5	60	80	208/3	TITUS	DESV	1,2
VAV-14	LAB BUILDING - PHASE 2-A	BREAKROOM AREA/CORRIDOR	12	425	2000	1470	50%	30	5	60	80	208/3	TITUS	DESV	1,2
VAV-15	LAB BUILDING - PHASE 2-A	CHEMISTRY LAB 103	10	300	1400	750	50%	30	5	60	80	208/3	TITUS	DESV	1,2
VAV-16	LAB BUILDING - PHASE 2-A	EXISTING RESTROOMS	10	300	1400	1000	100%	30	5	60	80	208/3	TITUS	DESV	1,2
VAV-17	LAB BUILDING - PHASE 2-B	CHEMISTRY LAB 103	10	300	1400	750	50%	30	5	60	80	208/3	TITUS	DESV	1,2
VAV-18	LAB BUILDING - PHASE 2-B	CHEMISTRY LAB 103	10	300	1400	750	50%	30	5	60	80	208/3	TITUS	DESV	1,2

NOTES:

1. PROVIDE WITH FACTORY INSTALLED STEP DOWN POWER TRANSFORMER AND DDC CONTROLLER TO CONTROL VAV TERMINAL OPERATION DURING HEATING AND COOLING MODES.
2. PROVIDE WITH AIRFLOW SWITCH.

EXHAUST AIR VALVE SCHEDULE

TAG NO.	AREA SERVED	SYSTEM SERVED	INLET SIZE (IN.)	AIRFLOW (CFM)	V/PHASE	BASIS OF DESIGN		NOTES
						MANUFACTURER	MODEL	
EAV-1	CHEMISTRY LAB - PHASE 2	FUME HOOD	12	750	120/1	PHOENIX CONTROLS	ACCELII	1
EAV-2	CHEMISTRY LAB - PHASE 2	FUME HOOD	12	750	120/1	PHOENIX CONTROLS	ACCELII	1
EAV-3	CHEMISTRY LAB - PHASE 2	LAB TABLE	12	1300	120/1	PHOENIX CONTROLS	ACCELII	1
EAV-4	MEDIA PREP	GENERAL EXHAUST	8	385	120/1	PHOENIX CONTROLS	ACCELII	1
EAV-5	MICROBIOLOGY	GENERAL EXHAUST	8	300	120/1	PHOENIX CONTROLS	ACCELII	1
EAV-6	SAMPLE RECEIVING AND INDUSTRIAL WASTE STATION	CANOPY HOOD	8	350	120/1	PHOENIX CONTROLS	ACCELII	1
EAV-7	SAMPLE RETENTION	FOR GCMS	8	220	120/1	PHOENIX CONTROLS	ACCELII	1
EAV-8	NSTRUMENTATION	GENERAL EXHAUST	8	450	120/1	PHOENIX CONTROLS	ACCELII	1
EAV-9	CHEMISTRY LAB - PHASE 3	FUME HOOD	12	750	120/1	PHOENIX CONTROLS	ACCELII	1
EAV-10	CHEMISTRY LAB - PHASE 3	FUME HOOD	12	750	120/1	PHOENIX CONTROLS	ACCELII	1
EAV-11	CHEMISTRY LAB - PHASE 3	LAB TABLE	12	1200	120/1	PHOENIX CONTROLS	ACCELII	1

NOTES:

1. PROVIDE WITH FACTORY INSTALLED STEP DOWN POWER TRANSFORMER AND DDC CONTROLLER TO CONTROL EAV TERMINAL OPERATION.

AIR DEVICE SCHEDULE

TAG NO.	DESCRIPTION	NECE SIZE (INCH)	MAX. APD (IN. WC)	MAX. NC	MATERIAL	MANUFACTURER	MODEL	NOTES
DG-1	DOOR MOUNTED GRILLE	16"x6"	0.1	30	ALUMINUM	PRICE	STG	5
EAD-1	EXHAUST AIR DIFFUSER, 24"x24" FACE SIZE	8"	0.1	30	ALUMINUM	TITUS	PAR	1,2,4
EAD-2	EXHAUST AIR DIFFUSER, 24"x24" FACE SIZE	12"	0.1	30	ALUMINUM	TITUS	PAR	1,2,4
EAD-3	EXHAUST AIR DIFFUSER, 12"x12" FACE SIZE	6"	0.1	30	ALUMINUM	TITUS	-	-
RG-1	RETURN AIR GRILLE, 24"x24" FACE SIZE	22"X22"	0.1	30	ALUMINUM	TITUS	PAR	1,2,4
RG-2	RETURN AIR GRILLE, 3/4" BLADE SPACING, 0° DEFLECTION	12"x6"	0.1	30	ALUMINUM	TITUS	350RL	1,2,4
RG-3	RETURN AIR GRILLE, 3/4" BLADE SPACING, 0° DEFLECTION	18"x12"	0.1	30	ALUMINUM	TITUS	350RL	1,2,4
SAD-1	SUPPLY AIR DIFFUSER, 24"x24" FACE SIZE	10"	0.1	30	ALUMINUM	TITUS	OMNI	1,2,3,4
SR-1	SUPPLY REGISTER, DOUBLE DEFLECTION, 3/4" BLADE SPACING, 45° DEFLECTION	12"x6"	0.1	30	ALUMINUM	TITUS	350FL	1,2,3,4
SR-2	SUPPLY REGISTER, DOUBLE DEFLECTION, 3/4" BLADE SPACING, 45° DEFLECTION	18"x12"	0.1	30	ALUMINUM	TITUS	350FL	1,2,3,4

NOTES:

1. DESIGN CFM AS NOTED ON HVAC PLANS.
2. DUCT SIZE DIFFUSER/REGISTER/GRILLE SHALL BE EQUAL TO NECK SIZE, UNLESS OTHERWISE NOTES (UON).
3. PROVIDE WITH VOLUME CONTROL DAMPER.
4. MANUFACTURER STANDARD OFF-WHITE FINISH.
5. DOOR GRILLE COLOR SHALL MATCH DOOR COLOR.

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED PROFESSIONAL ENGINEER — SAID TAHIR IBRAHIM — M 39357 — MECHANICAL — STATE OF CALIFORNIA

5/14/2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

HVAC SCHEDULES

Design by: S. IBRAHIM
Date: MAY 2025
Checked by: S. GOPIKUMAR
Date: MAY 2025
Drawn by: G. NITHIYAN
Date: MAY 2025
Checked by: S. IBRAHIM
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

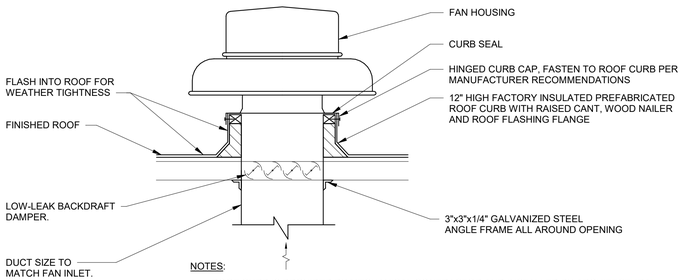
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 85 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

M-10

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Last Saved by: G. NITHIYAN Time: 5/12/2025 10:31:58 AM
Autodesk Docs://Joint Utilities Laboratory/HVZ000LB.rvt

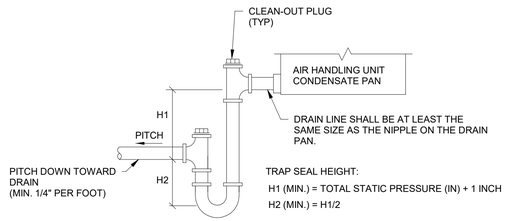


NOTES:

1. ROOF CURB IS PROVIDED BY MECHANICAL CONTRACTOR AND INSTALLED BY ARCHITECTURAL TRADES.
2. FAN AND CURB SHALL BE FROM SAME MANUFACTURER.
3. ROOF CURB SHALL BE SUITABLE FOR INSTALLATION ON A SLOPED ROOF. COORDINATE EXACT ROOF SLOPE WITH ARCHITECTURAL TRADES.

ROOF EXHAUST FAN

A DETAIL NTS

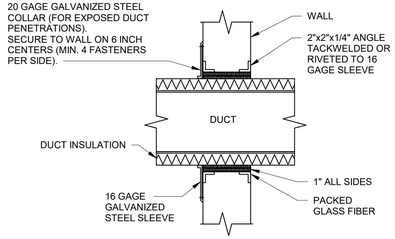


NOTES:

1. PROVIDE TEES W/ CLEAN-OUT PLUGS AT ALL 90° BENDS.
2. ALLOW SUFFICIENT SPACE BELOW DRAIN PAN FOR TRAPS.
3. SUPPORT LENGTHY DRAIN LINES TO PREVENT SAG AND CONDENSATE OVERFLOW.
4. MANUALLY PRIME FILL TRAP BEFORE START UP TO FORM INITIAL DRAIN SEAL.
5. CONDENSATE DISCHARGE MUST BE BELOW LEVEL OF DRAIN PAN.
6. PROVIDE CONDENSATE DRAIN PIPE WITH INSULATION ACCORDING TO SPECIFICATIONS SECTION 220719 (PLUMBING PIPING INSULATION).

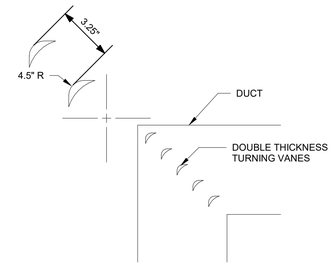
CONDENSATION DRAIN FOR DRAW-THROUGH UNIT

B DETAIL NTS



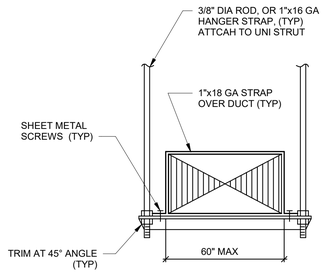
DUCT WALL PENETRATION (NON FIRE RATED WALL)

C DETAIL NTS

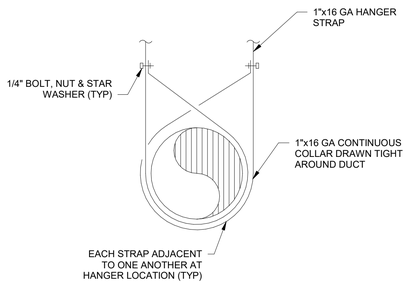


SHEET METAL DUCT TURNING VANES

D DETAIL NTS



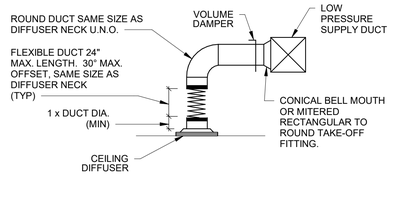
RECTANGULAR DUCT HANGER



ROUND DUCT HANGER

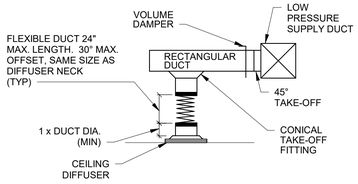
DUCT HANGERS

E DETAIL NTS



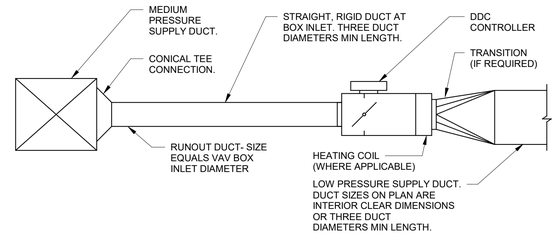
DIFFUSER INSTALLATION

F DETAIL NTS



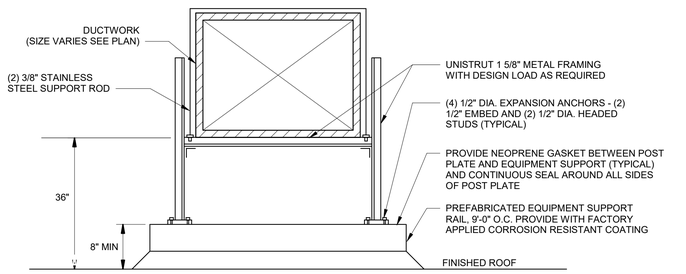
VAV TERMINAL CONNECTION

G DETAIL NTS



NOTES:

1. ALL TRADES TO MAINTAIN MINIMUM 24 INCHES CLEAR SPACE FOR ACCESS TO VAV TERMINAL CONTROLS AND HEATING COIL REMOVAL.
2. METAL STRAP HANGERS OR HANGER RODS FOR SUPPORT OF VAV TERMINAL SHALL NOT INTERFERE WITH ACCESS TO TERMINAL CONTROLS AND/OR HEATING COIL.



NOTES:

1. EQUIPMENT SUPPORT RAIL IS PROVIDED BY MECHANICAL CONTRACTOR AND INSTALLED BY ARCHITECTURAL TRADES.
2. BOLTS, NUTS, BRACKETS, FASTENERS AND MOUNTING HARDWARE SHALL BE TYPE 316 STAINLESS STEEL
3. PROVIDE METAL FRAMING ASSEMBLY WITH CORROSION RESISTANT COATING SUITABLE FOR WASTE WATER TREATMENT APPLICATIONS.

DUCT SUPPORT ON ROOF

H DETAIL NTS

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED PROFESSIONAL ENGINEER — SAID TASIR IBRAHIM — M 39357 — MECHANICAL — STATE OF CALIFORNIA

5/14/2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

HVAC DETAILS

Design by:	S. IBRAHIM	REVIEWED BY:	6/11/2025
Date:	MAY 2025	Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200	DATE
Checked by:	S. GOPIKUMAR	APPROVED BY:	6/11/2025
Date:	MAY 2025	Goutam K. Dobey, City Engineer, RCE 75646	DATE
Drawn by:	G. NITHIYAN	Sheet 86 of 126 Sheets	
Date:	MAY 2025	Scale Horiz. AS SHOWN	
Checked by:	S. IBRAHIM	Vert. AS SHOWN	M-11
Date:	MAY 2025		

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Last Saved by: G. NITHIYAN Time: 5/12/2025 10:31:59 AM
Autodesk Docs://Joint Utilities Laboratory/HVAC0000LB.rvt

STATE OF CALIFORNIA
Mechanical Systems
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-MCH-E
This document is used to demonstrate compliance for mechanical systems that are within the scope of the permit application and are demonstrating compliance using the prescriptive path outlined in 140.4, or 141.0(b)2 for alterations.		
Project Name: City of Redlands Joint Utilities Lab Building Renovation and Expansion Project	**Report Page:**	**(Page 1 of 15)**
Project Address: 1950 Nevada Street	**Date Prepared:**	4/29/2025

A. GENERAL INFORMATION

01	Project Location (city)	Redlands	04	Total Conditioned Floor Area	5753
02	Climate Zone	10	05	Total Unconditioned Floor Area	0
03	Occupancy Types Within Project:		06	# of Stories (Habitable Above Grade)	1

● Office ● All Other Occupancies

B. PROJECT SCOPE

This table Includes mechanical systems or components that are within the scope of the permit application and are demonstrating compliance using the prescriptive path outlined in 140.4, 170.2(b) or 141.0(b)2 and 180.2(b)2 for alterations.

01 Air System(s)		02 Wet System Components		03 Dry System Components	
☒	Heating Air System	☐	Water Economizer	☒	Air Economizer
☒	Cooling Air System	☐	Pumps	☐	Electric Resistance Heat
	Mechanical Controls	☐	System Piping	☒	Fan Systems
☒	Mechanical Controls (existing to remain, altered or new)	☐	Cooling Towers	☒	Ductwork (existing to remain, altered or new)
		☐	Chillers	☒	Ventilation
		☐	Boilers	☒	Zonal Systems/ Terminal Boxes

STATE OF CALIFORNIA
Mechanical Systems
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-MCH-E
Project Name: City of Redlands Joint Utilities Lab Building Renovation and Expansion Project	**Report Page:**	**(Page 2 of 15)**
	Date Prepared:	4/29/2025

C. COMPLIANCE RESULTS

Table C will indicate if the project data input into the compliance document is compliant with mechanical requirements. This table is not editable by the user. If this table says "DOES NOT COMPLY" or "COMPLIES with Exceptional Conditions" refer to Table D., or the table indicated as not compliant for guidance.

01		02		03		04		05		06		07		08	09
System Summary 110.1, 110.2, 140.4, 170.2(c)	AND	Pumps 140.4(k), 170.2(c)4I	AND	Fans/ Economizers 140.4(c), 140.4(e), 170.2(c)	AND	System Controls 110.2, 120.2, 140.4(f), 170.2(c)	AND	Ventilation 120.1, 160.2	AND	Terminal Box Controls 140.4(d), 170.2(c)4B	AND	Distribution 120.3, 140.4(l), 160.2, 160.3	AND	Cooling Towers 110.2(e)2	Compliance Results
(See Table F)		(See Table G)		(See Table H)		(See Table I)		(See Table J)		(See Table K)		(See Table L)		(See Table M)	
Yes	AND		AND	Yes	AND	Yes	AND	Yes	AND	Yes	AND	Yes	AND		COMPLIES
Mandatory Measures Compliance (See Table Q for Details)										COMPLIES					

D. EXCEPTIONAL CONDITIONS

This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.

E. ADDITIONAL REMARKS

This table includes remarks made by the permit applicant to the Authority Having Jurisdiction.

F. HVAC SYSTEM SUMMARY (DRY & WET SYSTEMS)

Space Conditioning System Information

01 System Name	02 Quantity	03 System Serving	04 System Status	05 Space Type	06 Utilizing Recovered Heat
PACU-1	1	Multi-zone	New/ Addition		☐
PACU-2	1	Multi-zone	New/ Addition		☐

STATE OF CALIFORNIA
Mechanical Systems
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-MCH-E
Project Name: City of Redlands Joint Utilities Lab Building Renovation and Expansion Project	**Report Page:**	**(Page 3 of 15)**
	Date Prepared:	4/29/2025

F. HVAC SYSTEM SUMMARY (DRY & WET SYSTEMS)

Dry System Equipment Sizing (includes air conditioners, condensers, heat pumps, VRF, furnaces and unit heaters and DOAS systems)

01	02	03	04	05	06	07	08	09	10	11
				Equipment Sizing per Mechanical Schedule (kBtu/h) 140.4(a&b), 170.2(c)1 & 170.2(c)2						
				Heating Output[2,3]			Cooling Output[2,3]		Load Calculations[3,4]	
Name or Item Tag	Equipment Category per Tables 110.2, 140.4(a)2 and 170.2(c)3aii	Equipment Type per Tables 110.2 and Title 20	Smallest Size Available[1] 140.4(a) and 170.2(c)1	Per Design (kBtu/h)	Rated (kBtu/h)	Supp. Heating Output (kBtu/h)	Sensible Per Design (kBtu/h)	Rated (kBtu/h)	Total Heating Load (kBtu/h)	Total Sensible Cooling Load (kBtu/h)
PACU-1	Unitary Heat Pumps	Air-cooled, pkg (3 phase)	NA: Load Controls	31.34	48.83	0	81.07	76.5	179.51	145.34
PACU-2	Unitary Heat Pumps	Air-cooled, pkg (3 phase)	NA: Load Controls	73.8	115	0	478.08	412	742.55	876.91

[1]FOOTNOTES: Equipment shall be the smallest size, within the available options of the desired equipment line, necessary to meet the design heating and cooling loads of the building per 140.4(a) and 170.2(c)1. Healthcare facilities are excepted.
[2]It is common practice to show rated output capacity on the equipment schedule. Sensible cooling output comes from specification sheet tables.
[3] If equipment is heating only, leave cooling output and load blank. If equipment is cooling only, leave heating output and load blank.
[4] Authority Having Jurisdiction may ask for load calculations used for compliance per 140.4(b) and 170.2(c).

Dry System Equipment Efficiency (other than Package Terminal Air Conditioners (PTAC) and Package Terminal Heat Pumps (PTHP), DX-DOAS and Dual Fuel Heat Pumps)

01	02	03	04	05	06	07	08	09
		Heating Mode				Cooling Mode		
Name or Item Tag	Size Category (Btu/h)	Rating Condition (°F)	Efficiency Unit	Minimum Efficiency Required per Tables 110.2 / Title 20	Design Efficiency	Efficiency Unit	Minimum Efficiency Required per Tables 110.2 / Title 20	Design Efficiency
PACU-1	>=65,000 and <135,000		COP	3.4	2.2	EER IEER	11 14.1	12 17.5
PACU-2	>=240,000		COP	3.2	2.2	EER IEER	9.5 12.5	8.1 17.5

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600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

LICENSED PROFESSIONAL ENGINEER — SAID TASIR IBRAHIM — M 39357 — MECHANICAL — STATE OF CALIFORNIA
5/14/2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
	Revisions			

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

TITLE 24 MECHANICAL FORMS - SHEET 1

Design by: S. IBRAHIM — Date: MAY 2025
Checked by: S. GOPIKUMAR — Date: MAY 2025
Drawn by: G. NITHIYAN — Date: MAY 2025
Checked by: S. IBRAHIM — Date: MAY 2025

REVIEWED BY: Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 — 6/11/2025 DATE
APPROVED BY: Goutam K. Dobey, City Engineer, RCE 75646 — 6/11/2025 DATE

Sheet 87 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

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Last Saved by: G. NITHIYAN Time: 5/12/2025 10:32:13 AM
Autodesk Docs://Joint Utilities Laboratory/HVZ000LB.rvt

G. PUMPS

This section does not apply to this project.

H. FAN SYSTEMS & AIR ECONOMIZERS

This table is used to demonstrate compliance with prescriptive requirements found in 140.4(c), 140.4(e), 140.4(m), 170.2(c)3, and 170.2(c)4A for fan systems. Fan systems serving only process loads are exempt from these requirements and do not need to be included in Table H.

System Name	PACU-1	Quantity	1	Fan System Status	New	System Zoning	Multi-zone VAV systems	Serving Dwelling Units	Not Serving Dwelling Units	Fan System Airflow (cfm)	3,000	Site Elevation	1,318	Economizer	Differential Temperature
01	02	03	04			05		06	07	08	09			10	11

Fan Name or Item Tag	Fan Type	Qty	Component	Airflow through Component (%)	Water Gauge (w.g)	Allowance: Component Allowance	Allowance: Fan Allowance (watt/cfm)[3]	Design: Design Electrical Input Power Method	Design: Motor Nameplate Horsepower	Design: Design Electrical Input Power (kW)
SF	Supply	1	Base Allowance for system serving spaces <=6 floors away	100		1185		Manufacturer provided		1.84
			MERV 13-16 Filter upstream of thermal conditioning equipment	100		408				
			Hydronic/DX cooling coil or heat pump coil	100		405				
			Economizer Return Damper	100		135				
Supply Fan Base Allowance (kW)			Exhaust/Return/Relief/Transfer Fan Base Allowance(kW)			Fan System Allowance (kW)[3]		2.13	Fan System Electrical Output (kW)	1.84

H. FAN SYSTEMS & AIR ECONOMIZERS

System Name	PACU-2	Quantity	1	Fan System Status	New	System Zoning	Multi-zone VAV systems	Serving Dwelling Units	Not Serving Dwelling Units	Fan System Airflow (cfm)	7,000	Site Elevation	1,318	Economizer	Differential Temperature
01	02	03	04			05		06	07	08	09			10	11

Fan Name or Item Tag	Fan Type	Qty	Component	Airflow through Component (%)	Water Gauge (w.g)	Allowance: Component Allowance	Allowance: Fan Allowance (watt/cfm)[3]	Design: Design Electrical Input Power Method	Design: Motor Nameplate Horsepower	Design: Design Electrical Input Power (kW)
SF	Supply	1	Base Allowance for system serving spaces <=6 floors away	100		3171		Manufacturer provided		3.37
			MERV 13-16 Filter upstream of thermal conditioning equipment	100		798				
			Hydronic/DX cooling coil or heat pump coil	100		798				
			100% outdoor air system	100		0				
Supply Fan Base Allowance (kW)			Exhaust/Return/Relief/Transfer Fan Base Allowance(kW)			Fan System Allowance (kW)[3]		4.77	Fan System Electrical Output (kW)	3.37

[1] FOOTNOTES: Fans serving spaces with design background noise goals below NC35

[2] Low-turndown single-zone VAV fan system must be capable of and configured to reduce airflow to 50 percent of design airflow and use no more than 30 percent of the design wattage at that airflow. No more than 10 percent of the design load served by the equipment shall have fixed loads.

[3] Fan system allowance includes fan system base allowance.

[4] Filter pressure loss can only be counted once per fan system.

[5] Complex Fan System means a fan system that combines a single cabinet fan system with other supply fans, exhaust fans, or both.

[6] Computer room economizers must meet requirements of 140.9(a) and will be documented on the NRCC-PRC-E document..

H. EXHAUST AIR HEAT RECOVERY 140.4(q), 170.2(c)4O

01	02	03	04	05	06	07	08	09	10	11

H. EXHAUST AIR HEAT RECOVERY 140.4(q), 170.2(c)4O

Fan System Name	Qty	Hours of Operation per Year	Design Supply Airflow Rate	Outdoor Airflow	% Outdoor Air at Full Design Airflow	Exemptions to Exhaust Air Heat Recovery Requirement per 140.4(q) & 170.2(c)4O	Exhaust Air Heat Recovery 140.4(q) & 170.2(c)4O	Type Of Heat Recovery Rating	Required Recovery Ratio	Energy Recovery Bypass

Fan Energy Index (FEI)

01	02	03
Name or Item Tag	FEI Exception	FEI
PACU-1	Altered Fan System	
PACU-2	Dx-DOAS Unit	

I. SYSTEM CONTROLS

This table is used to demonstrate compliance with mandatory controls in 110.2 and 120.2 and prescriptive controls in 140.4(f) and (n), 170.2(c)4D 170.2(c)4L or requirements in 141.0(b)2E 180.2(b)2 for altered space conditioning systems.

01	02	03	04	05	06	07	08	09
System Name	System Zoning	Conditioned Floor Area Being Served (ft^2)	Thermostats 110.2(b) & (c)[1], 120.2(a) 160.3(a)2A or 141.0(b)2E & 180.2(b)2	Shut-Off Controls 120.2(e) & 160.3(a)2D	Isolation Zone Controls 120.2(g) & 160.3(a)2F	Demand Response 110.12 120.2(b) & 160.3(a)2B	Supply Air Temp. Reset 140.4(f) & 170.2(c)4D	Window Interlocks per 140.4(n) & 170.2(c)4D
PACU-1	Multi-zone w/ DDC to zone	<= 25,000 ft^2	Setback	Auto Timer Switch	NA: Serves < 25k ft^2	NA: PTAC, PTHP, Rm AC, HP	NA: Controls prevent reheat/recool/simultaneous	NA: No operable windows
PACU-2	Multi-zone w/ DDC to zone	<= 25,000 ft^2	Setback	Auto Timer Switch	NA: Serves < 25k ft^2	NA: PTAC, PTHP, Rm AC, HP	NA: Controls prevent reheat/recool/simultaneous	NA: No operable windows

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LICENSED PROFESSIONAL ENGINEER — SAID YASIR IBRAHIM — M 39357 — MECHANICAL — STATE OF CALIFORNIA
5/14/2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

TITLE 24 MECHANICAL FORMS - SHEET 2

Design by: S. IBRAHIM
Date: MAY 2025
Checked by: S. GOPIKUMAR
Date: MAY 2025
Drawn by: G. NITHIYAN
Date: MAY 2025
Checked by: S. IBRAHIM
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 88 of 126 Sheets
Scale Horiz. AS SHOWN
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I. SYSTEM CONTROLS

[1]*FOOTNOTES: Gravity gas wall heaters, gravity floor heaters, gravity room heaters, non-central electric heaters, fireplaces or decorative gas appliances, wood stoves are not required to have setback thermostats.*

J. VENTILATION AND INDOOR AIR QUALITY

This table is used to demonstrate compliance with mandatory ventilation requirements in 120.1 120.2(e)3B 140.4(p) and 140.4(q) for all nonresidential and hotel/motel and d:t24refnolink/]160.2, 160.3(a)3D, 170.2(a)4N, 170.2(a)4O for high-rise residential occupancies. For alterations, only ventilation systems being altered within the scope of the permit application need to be documented in this table. In lieu of this table, the required outdoor ventilation rates and airflows may be shown on the plans or the calculations can be presented in a spreadsheet.

01	☐	Check the box if the project is showing ventilation calculations on the plans, or attaching the calculations instead of completing this table.
02	☒	Check this box if the project included Nonresidential, Hotel/Motel Spaces or Multifamily Common Use Spaces
	☐	
03	☐	Check the box if the project is using natural ventilation in any nonresidential or hotel/motel spaces to meet required ventilation rates per 120.1(c)2.

Nonresidential and Hotel/ Motel Multifamily Common Use Ventilation Systems

04		05			06			07	
System Name	PACU-1	System Design OA CFM Airflow[1]		391	System Design Transfer Air CFM		0	Air Filtration per 120.1(c) 141.0(b)2 and 160.2(c)21[2]	
								Provided	
08	09	10	11	12	13	14	15	16	
Space Name or Item Tag	Mechanical Ventilation Required per 120.1(c)3[3] & 160.2(c)3					Exh. Vent per 120.1(c)4 & 160.2(c)4		DCV or Sensor Controls per 120.1(d)3, 120.1(d)5, and 120.1(e)3[6] 160.2(c)5D 160.2(c)5E 160.2(c)5D	
	Occupancy Type[4]	Conditioned Floor Area (ft[2])	# of Shower heads/ toilets	# of people[5]	Required Min OA CFM	Required Min CFM	Provided per Design CFM		
VAV-1 (Office 1)	Office space	165		3	45	0	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type

J. VENTILATION AND INDOOR AIR QUALITY

VAV-2 (Office 2)	Office space	165		3	45	0	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type
VAV-3 (Office 3)	Office space	130		3	45	0	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type
VAV-4 (Conference Room)	Office space	270		10	150	0	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type
VAV-5 (Open Office)	Office space	767		6	91	0	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type
VAV-6 (Office Supplies/Mail)	Office space	222		1	15	0	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type
VAV-7 (Electrical Room)	All others	66		0	0	0	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type
17	Total System Required Min OA CFM				391	18	Ventilation for this System Complies?		Yes

04		05			06			07	
System Name	PACU-2	System Design OA CFM Airflow[1]		7000	System Design Transfer Air CFM		0	Air Filtration per 120.1(c) 141.0(b)2 and 160.2(c)21[2]	
								Provided	
08	09	10	11	12	13	14	15	16	

J. VENTILATION AND INDOOR AIR QUALITY

Space Name or Item Tag	Mechanical Ventilation Required per 120.1(c)3[3] & 160.2(c)3					Exh. Vent per 120.1(c)4 & 160.2(c)4		DCV or Sensor Controls per 120.1(d)3, 120.1(d)5, and 120.1(e)3[6] 160.2(c)5D 160.2(c)5E 160.2(c)5D	
	Occupancy Type[4]	Conditioned Floor Area (ft[2])	# of Shower heads/ toilets	# of people[5]	Required Min OA CFM	Required Min CFM	Provided per Design CFM		
VAV-8 (Media Prep)	Office space	232		1	15	0	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type
VAV-9 (Microbiology)	Office space	250		1	15	0	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type
VAV-10 (Chemisrty Lab-Phase 2A)	Office space	805		4	60	0	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type
VAV-11 (Sample Receiving)	Office space	291		1	15	0	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type
VAV-12 (Sampel Retention)	Office space	181		1	15	0	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type
VAV-13 (Instrument Lab)	Office space	291		1	15	0	0	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type

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LICENSED PROFESSIONAL ENGINEER — SAID YASIR IBRAHIM — M 39357 — MECHANICAL — STATE OF CALIFORNIA
5/14/2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

TITLE 24 MECHANICAL FORMS - SHEET 3

Design by: S. IBRAHIM
Date: MAY 2025
Checked by: S. GOPIKUMAR
Date: MAY 2025
Drawn by: G. NITHIYAN
Date: MAY 2025
Checked by: S. IBRAHIM
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

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J. VENTILATION AND INDOOR AIR QUALITY

VAV-14 (Break Room Area)	All others	1106		8	120	0	1470	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type
VAV-16 (Restrooms)	All others	812		8	120	0	1000	DCV	NA: Not required per §120.1(d)3
								Occ Sensor	NA: Not required space type
17	Total System Required Min OA CFM				375	18	Ventilation for this System Complies?		Yes

[1] FOOTNOTES: System CFM should include both mechanical and natural ventilation for the zone/system

[2] Air filtration requirements apply to the following three system types per 120.1(c)1A: space conditioning systems utilizing ducts to supply air to occupiable space; supply-only ventilation systems providing outside air to occupiable space; supply side of balanced ventilation systems including heat recovery and energy recovery ventilation systems providing outside air to occupiable space.

[3] Uniform Mechanical Code may have more stringent ventilation requirements; the most stringent code requirement takes precedence.

[4] See Standards Tables 120.1-A and 120.1-B.

[5] For lecture halls with fixed seating, the expected number of occupants shall be determined in accordance with the California Building Code.

[6] 120.2(e)3 requires systems serving rooms that are required by 130.1(c) to have lighting occupancy sensing controls to also have occupancy sensing zone controls for ventilation. Examples of spaces which require lighting occupancy sensors include offices 250ft^2 or smaller, multipurpose rooms less than 1,000 ft^2, classrooms, conference rooms, restrooms, aisles and open areas in warehouses, library book stack aisles, corridors, stairwells, parking garages, and loading and unloading zones, unless excepted by 130.1(c).

K. TERMINAL BOX CONTROLS

This table is used to demonstrate compliance with prescriptive zone control requirements in 140.4(d) & 170.2(c)4B.

01	02	03	04	05	06	07	08	09	10	11	12
		Design			Deadband Compliance			Reheated, Recooled, Mixed Air Compliance			
Zone/System/VAV Box Name or Item Tag	Zonal Control Strategy per 140.4(d)	Peak Primary Airflow CFM	Primary Air in Deadband CFM	Reheated Recooled Mixed Airflow CFM	Outside Air CFM	30% of Peak Primary Airflow CFM	Max Deadband Airflow CFM	50% of Peak Primary Airflow	1st Stage Modulates <=95 °F and Maintains DB Rate?	2nd Stage Modulates from DB Flow to Heating Max Flow?	Complies
VAV-1 (Office 1)	VAV with DDC @ zone	365	0	183	45	73	74	182.5	Yes	Yes	Yes
VAV-2 (Office 2)	NA: Peak SA <= 300 CFM	230	0	115	45	46	47	115	Yes	Yes	Yes
VAV-3 (Office 3)	NA: Peak SA <= 300 CFM	230	0	115	45	46	47	115	Yes	Yes	Yes
VAV-4 (Conference Room)	VAV with DDC @ zone	540	0	270	150	108	151	270	Yes	Yes	Yes
VAV-5 (Open Office)	VAV with DDC @ zone	740	0	370	115	148	149	370	Yes	Yes	Yes
VAV-6 (Office Supplies/Mail)	VAV with DDC @ zone	400	0	200	33.3	80	81	200	Yes	Yes	Yes
VAV-7 (Electrical Room)	VAV with DDC @ zone	685	0	340	0	137	138	342.5	Yes	Yes	Yes
VAV-8 (Media Prep)	VAV with DDC @ zone	385	0	105	34.8	77	78	192.5	Yes	Yes	Yes
VAV-9 (Microbiology)	NA: Peak SA <= 300 CFM	300	0	105	37.5	60	61	150	Yes	Yes	Yes
VAV-10 (Chemisrty Lab-Phase 2A)	VAV with DDC @ zone	750	0	300	120.8	150	151	375	Yes	Yes	Yes
VAV-11 (Sample Receiving)	VAV with DDC @ zone	350	0	105	43.6	70	71	175	Yes	Yes	Yes
VAV-12 (Sampel Retention)	NA: Peak SA <= 300 CFM	220	0	105	27.2	44	45	110	Yes	Yes	Yes
VAV-13 (Instrument Lab)	VAV with DDC @ zone	350	0	105	43.6	70	71	175	Yes	Yes	Yes
VAV-14 (Break Room Area)	VAV with DDC @ zone	1470	0	735	120	294	295	735	Yes	Yes	Yes

K. TERMINAL BOX CONTROLS

VAV-16 (Restrooms)	VAV with DDC @ zone	1000	0	500	120	200	201	500	Yes	Yes	Yes

L. DISTRIBUTION (DUCTWORK and PIPING)

This table is used to show compliance with mandatory pipe insulation requirements found in 120.3 and mandatory requirements found in 120.4(g) for duct sealing.

01	☐	Insulation shall be protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind. Insulation exposed to weather shall be installed with a cover suitable for outdoor service. Insulation covering chilled water piping and refrigerant suction piping located outside the conditioned space shall have a Class I or Class II vapor retarder. All penetrations and joints of which shall be sealed.

Duct Leakage Testing

The answers to the questions below apply to the following duct systems:	PACU-1	**NR/ Common Use:** Duct leakage testing shall not exceed 6% per NA7.5.3 required for these systems?	No
		Dwelling Units: Total duct leakage of duct system shall not exceed 12% or duct system to outside shall not exceed 6% per RA3.1.4 required for systems?	No
		Duct leakage testing per CMC Section 603.10.1 required for these systems?	Yes

11	No	The scope of the project includes only duct systems serving healthcare facilities
12	No	Duct system provides conditioned air to an occupiable space for a constant volume, single zone, space-conditioning system.
13	Yes	The space conditioning system serves less than 5,000 ft^2 of conditioned floor area.
14	No	The combined surface area of the ducts is more than 25% of the total surface area of the entire duct system:
15		The scope of the project includes extending an existing duct system, which is constructed, insulated or sealed with asbestos.
16	No	The scope of the project includes an existing duct system that is documented to have been previously sealed as confirmed through field verification and diagnostic testing in accordance with procedures in the Reference Nonresidential Appendix NA2.
17		All Ductwork and plenums with pressure class ratings shall be constructed to Seal Class A
18		All ductwork is an extension of an existing duct system
19		Ductwork serving individual dwelling unit
20		< 25 ft of new or replacement space conditioning ducts installed
21	R-8	Duct Insulation R-value
22		
23		

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5/14/2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

TITLE 24 MECHANICAL FORMS - SHEET 4

Design by: S. IBRAHIM
Date: MAY 2025
Checked by: S. GOPIKUMAR
Date: MAY 2025
Drawn by: G. NITHIYAN
Date: MAY 2025
Checked by: S. IBRAHIM
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 90 of 126 Sheets
Scale Horiz. AS SHOWN
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L. DISTRIBUTION (DUCTWORK and PIPING)

The answers to the questions below apply to the following duct systems:	PACU-2	**NR/ Common Use:** Duct leakage testing shall not exceed 6% per NA7.5.3 required for these systems?	No
		Dwelling Units: Total duct leakage of duct system shall not exceed 12% or duct system to outside shall not exceed 6% per RA3.1.4 required for systems?	No
		Duct leakage testing per CMC Section 603.10.1 required for these systems?	Yes

11	No	The scope of the project includes only duct systems serving healthcare facilities
12	No	Duct system provides conditioned air to an occupiable space for a constant volume, single zone, space-conditioning system.
13	Yes	The space conditioning system serves less than 5,000 ft^2 of conditioned floor area.
14	No	The combined surface area of the ducts is more than 25% of the total surface area of the entire duct system:
15		The scope of the project includes extending an existing duct system, which is constructed, insulated or sealed with asbestos.
16	No	The scope of the project includes an existing duct system that is documented to have been previously sealed as confirmed through field verification and diagnostic testing in accordance with procedures in the Reference Nonresidential Appendix NA2.
17		All Ductwork and plenums with pressure class ratings shall be constructed to Seal Class A
18		All ductwork is an extension of an existing duct system
19		Ductwork serving individual dwelling unit
20		< 25 ft of new or replacement space conditioning ducts installed
21	R-8	Duct Insulation R-value
22		
23		

M. COOLING TOWERS

This section does not apply to this project.

N. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

Selections have been made based on information provided in previous tables of this document. If any selection needs to be changed, please explain why in Table E Additional Remarks. These documents must be provided to the building inspector during construction and can be found online at https://www.energy.ca.gov/title24/2019standards/2019_compliance_documents/Nonresidential_Documents/NRCI/

Form/Title
NRCI-MCH-01-E - Must be submitted for all buildings

O. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

Selections have been made based on information provided in previous tables of this document. If any selection needs to be changed, please explain why in Table E Additional Remarks. These documents must be provided to the building inspector during construction and can be found online at https://www.energy.ca.gov/title24/2019standards/2019_compliance_documents/Nonresidential_Documents/NRCA/

Form/Title	Systems/Spaces To Be Field Verified
NRCA-MCH-02-A - Outdoor Air must be submitted for all newly installed HVAC units. Note: MCH-02-A can be performed in conjunction with MCH-07-A Supply Fan VFD Acceptance (if applicable) since testing activities overlap.	PACU-1; PACU-2;
NRCA-MCH-05-A - Air Economizer Controls	PACU-1;
NRCA-MCH-07-A Supply Fan Variable Flow Controls	PACU-1; PACU-2;
NRCA-MCH-12-A FDD for Packaged Direct Expansion Units	PACU-1;

P. DECLARATION OF REQUIRED CERTIFICATES OF VERIFICATION

There are no NRCV forms required for this project.

Q. MANDATORY MEASURES DOCUMENTATION LOCATION

This table is used to indicate where mandatory measures are documented in the plan set or construction documentation.

01		02
Compliance with Mandatory Measures documented through MCH Mandatory Measures Note Block	Yes	Plan sheet or construction document location: M-Sheets

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name:	Documentation Author Signature:
Company: CAMP DRESSER & McKEE	Signature Date:
Address:	CEA/ HERS Certification Identification (if applicable):
City/State/Zip:	Phone:

RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name: Said Ibrahim	Responsible Designer Signature:
Company: CDM Smith	Date Signed: 2025-04-29
Address: 2295 Gateway Oaks Drive, Suite 250	License: M39357
City/State/Zip: Sacramento CA 95833	Phone:

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Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

TITLE 24 MECHANICAL FORMS - SHEET 5

Design by: S. IBRAHIM
Date: MAY 2025
Checked by: S. GOPIKUMAR
Date: MAY 2025
Drawn by: G. NITHIYAN
Date: MAY 2025
Checked by: S. IBRAHIM
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

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GENERAL ABBREVIATIONS

A	@	AT
	AD	AREA DRAIN
	AFF	ABOVE FINISHED FLOOR
	AV	ACID VENT
	AW	ACID WASTE
B	BAFP	BACKFLOW PREVENTER
	BLDG	BUILDING
	BOP	BOTTOM OF PIPE
	BWV	BACKWATER VALVE
C	℄	CENTERLINE
	CA	COMPRESSED AIR
	CI	CAST IRON
	CO	CLEANOUT
	CONT	CONTINUOUS, CONTINUE
	CS	CUP SINK, CARBON STEEL
	CU	COPPER
	CU FT	CUBIC FEET
	CV	CHECK VALVE
	CW	COLD WATER
D	D	DRAIN
	DCO	DOUBLE CLEANOUT
	DI	DUCTILE IRON/DEIONIZED WATER
	DN	DOWN
	DW	DISHWASHER
	DWG	DRAWING
E	E	EMERGENCY WATER
	ECO	EXTERIOR CLEANOUT
	EL	ELEVATION
	ES	EMERGENCY SHOWER
	ESEW	EMERGENCY SHOWER / EYEWASH STATION
	EWC	ELECTRIC WATER COOLER
	EWU	EYE WASH UNIT
F	FAS	FLOW ALARM SWITCH
	FCO	FLOOR CLEANOUT
	FD	FLOOR DRAIN
	FE	FIRE EXTINGUISHER
	FHV&C	FIRE HOSE VALVE AND CABINET
	FS	FLOW SWITCH
	FV	FIRE VALVE
	F/BS	FACE/BODY SPRAY
G	GAL	GALLONS
	GPM	GALLONS PER MINUTE
H	HB	HOSE BIBB
	HD	HUB DRAIN
	HEV	HOSE END VALVE
	HW	HOT WATER
	HWR	HOT WATER RETURN
I	INV	INVERT
	IOS	INSTALLED BY OTHER SECTION
	IPS	IRON PIPE SIZE
K	KS	KITCHEN SINK
	KU	KITCHEN UNIT
L	LAB	LABORATORY
	LAV	LAVATORY
	LBV	LOCKABLE BALL VALVE
	LCW	LAB COLD WATER
	LHW	LAB HOT WATER
	LS	LAB SINK
	LSV	LOCK SHIELD VALVE
M	MAX	MAXIMUM
	MIN	MINIMUM
	MS	MOP SINK / BASIN
N	NC	NORMALLY CLOSED
	NG	NATURAL GAS
	NO	NUMBER/NORMALLY OPEN
	NPW	NON-POTABLE WATER
O	OED	OPEN END OR OPEN EQUIPMENT DRAIN
	ORD	OVERFLOW ROOF DRAIN
	ORL	OVERFLOW RAIN LEADER
P	PD	PUMP DISCHARGE
	PG	PRESSURE GAUGE
	PH	POST HYDRANT
	PHW	PROTECTED HOT WATER
	PI	PRESSURE INDICATOR
	PRLV	PRESSURE RELIEF VALVE
	PRV	PRESSURE REDUCING VALVE
	PSI	POUNDS PER SQUARE INCH
	P&T	PRESSURE & TEMPERATURE
	PVC	POLYVINYL CHLORIDE
	PTW	PROTECTED WATER
	PW	POTABLE WATER
R	RD	ROOF DRAIN
	RM	ROOM
	RPP	REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER
	RWL	RAINWATER LEADER
S	S	SOIL
	SA	SHOCK ABSORBER
	SF	SQUARE FOOT
	SH	SHOWER
	SHT	SHEET
	SP	SPRINKLER
	SQ	SQUARE
	SS	SANITARY SEWER
	SK	SINK
	SSK	SERVICE SINK
T	T&P	TEMPERATURE & PRESSURE RELIEF
	TD	TRENCH OR TROUGH DRAIN
	THK	THICK(NESS)
	TP	TRAP PRIMER
	TW	TEPID WATER
	TWR	TEPID WATER RETURN
	TYP	TYPICAL
U	UNO	UNLESS NOTED OTHERWISE
	UR	URINAL
V	V	VENT
	VAC	VACUUM
	VB	VACUUM BREAKER
	VE	VACUUM EXHAUST
	VTR	VENT THROUGH ROOF
W	W	WASTE
	W/	WITH
	WC	WATER CLOSET
	WCO	WALL CLEANOUT
	WD	WALL HYDRANT
	WF	WASH FOUNTAIN
	WH	WATER HEATER
	WHS	WASH HOSE STATION
	WT	(SANITARY) WASTE
	W&T	WASTE & TRAP
	W&V	WASTE & VENT
	WW	WASTE WATER

SYMBOLS

- VALVE
- LOCKABLE BALL VALVE
- CHECK VALVE
- GATE VALVE
- BALL VALVE
- GLOBE VALVE
- FLOW BALANCING AND SHUTOFF VALVE
- BUTTERFLY VALVE
- PLUG VALVE
- SHOCK ABSORBER W/ ISOLATION VALVE
- SOLENOID VALVE (S)
- TEMPERATURE & PRESSURE RELIEF VALVE
- RAIN LEADER DISCHARGE SPOUT
- FLOW ALARM SWITCH
- EMERGENCY SHOWER / EYEWASH STATION
- EQUIPMENT PROVIDED UNDER PLUMBING SECTION
- CO — CLEANOUT
- FLOOR CLEANOUT
- WCO — WALL CLEANOUT
- DCO — DOUBLE CLEANOUT
- FLOOR DRAIN
- OPEN END OR EQUIPMENT DRAIN
- HOSE BIBB
- HOSE REEL
- WATER PROOF SLEEVE
- NEW CONNECTION TO EXISTING
- SLAB PENETRATION
- INLINE CIRCULATION PUMP
- Y-PATTERN STRAINER
- "TO DRAIN"
- PRESSURE GAUGE
- THERMOMETER
- REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER (RPP)

DN OR DROP
"DN" DENOTES PIPES WHICH PENETRATE THE FLOOR BELOW.
"DROP" DENOTES PIPES WHICH DO NOT.

UP OR RISE
"UP" DENOTES PIPES WHICH PENETRATE THE FLOOR ABOVE.
"RISE" DENOTES PIPES WHICH DO NOT.

NOTE: THE TERMS "DN" "DROP" "UP" & "RISE" ARE USED TO INDICATE THE VERTICAL DIRECTION IN WHICH A PIPE LINE CONTINUES FROM THE IMAGINARY PLANE OF VIEW. THE TERMS HAVE NO RELEVANCE TO THE DIRECTION OF FLOW WITHIN THE PIPE LINE.

SYMBOLS

- CAP
- BOTTOM CONNECTION
- TOP CONNECTION
- ELBOW UP
- ELBOW DOWN
- P-TRAP
- TEE
- TEE UP
- TEE DOWN
- UNION-SCREWED
- UNION-FLANGED

NOTE: THIS IS A GENERAL LIST OF SYMBOLS AND ABBREVIATIONS. NOT ALL ITEMS SHOWN HERE APPEAR ON THE CONTRACT DRAWINGS.

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LICENSED PROFESSIONAL ENGINEER — SAID TASIR IBRAHIM — M 39357 — MECHANICAL — STATE OF CALIFORNIA
5/14/2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

PLUMBING ABBREVIATION, SYMBOLS AND GENERAL NOTES

Design by: S. IBRAHIM
Date: MAY 2025
Checked by: S. GOPIKUMAR
Date: MAY 2025
Drawn by: G. NITHIYAN
Date: MAY 2025
Checked by: S. IBRAHIM
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

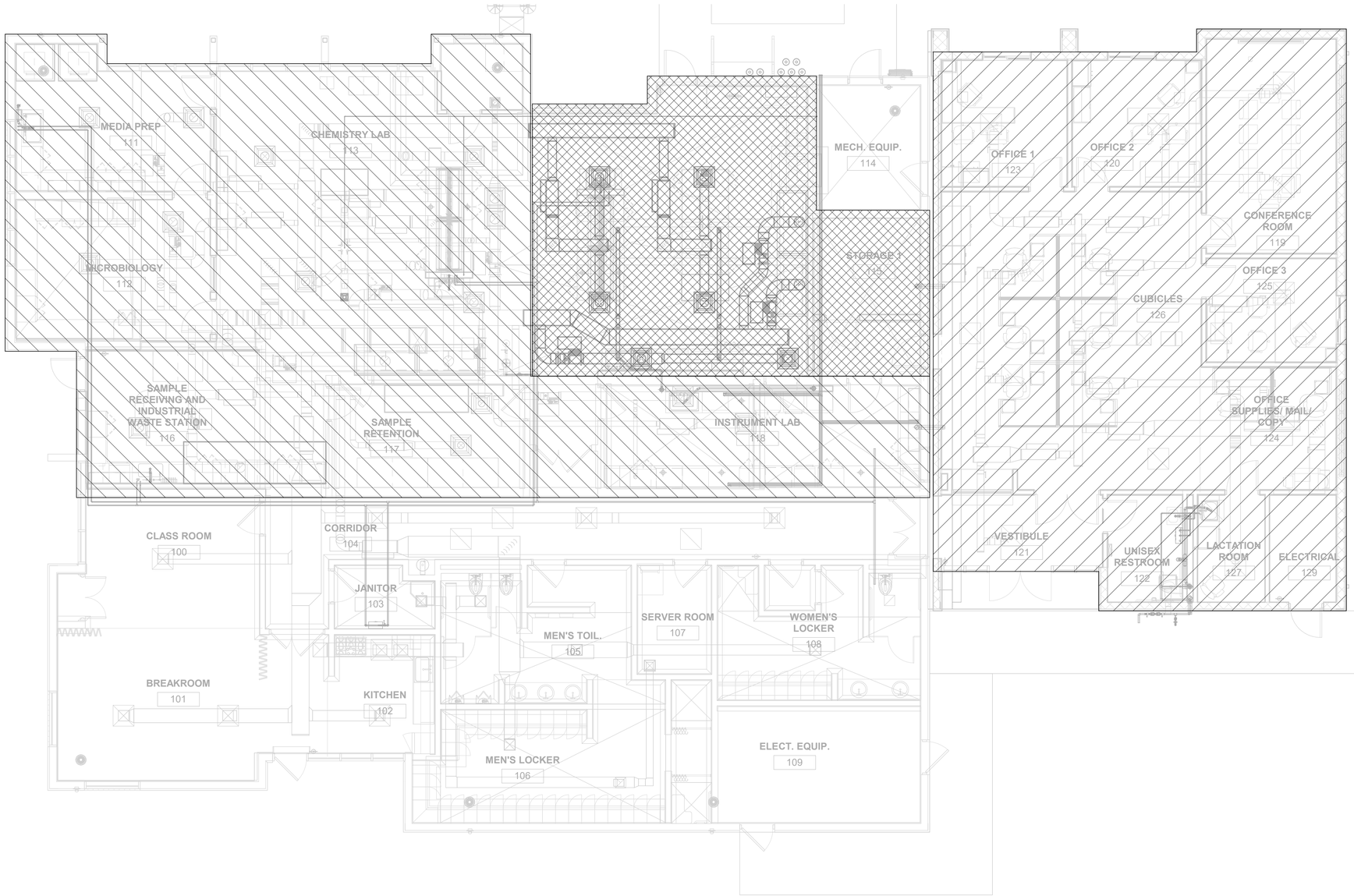
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

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P-1

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PLUMBING PLAN

3/16" = 1'-0"

3/16" = 1'- 0"

4 0 4 8

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LICENSED PROFESSIONAL ENGINEER — SAID YASIR IBRAHIM — M 39357 — MECHANICAL — STATE OF CALIFORNIA

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Municipal Utilities and Engineering Department

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PLUMBING CONSTRUCTION PHASES

Design by: S. IBRAHIM
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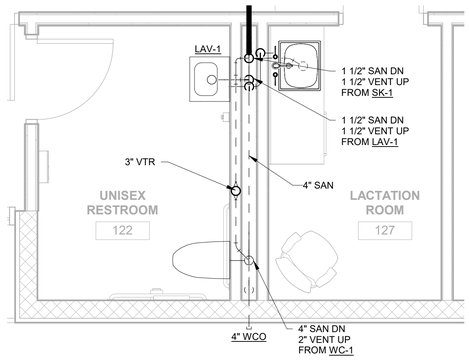
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Goutam K. Dobey, City Engineer, RCE 75646 DATE

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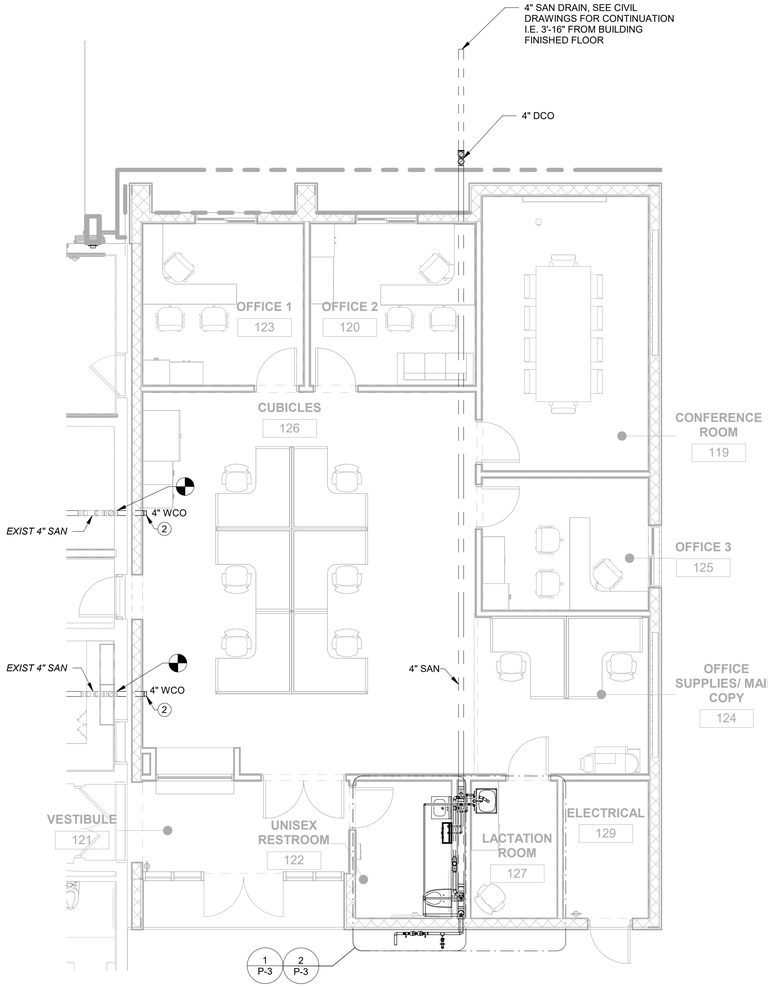
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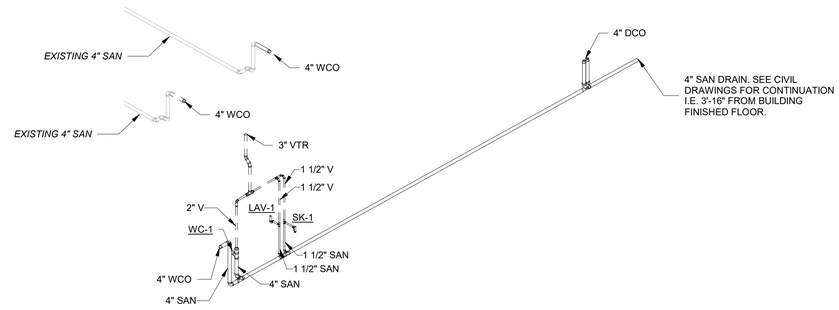
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1 PLUMBING SANITARY ENLARGED PLAN - PHASE 1
P-3 — 3/8" = 1'-0"

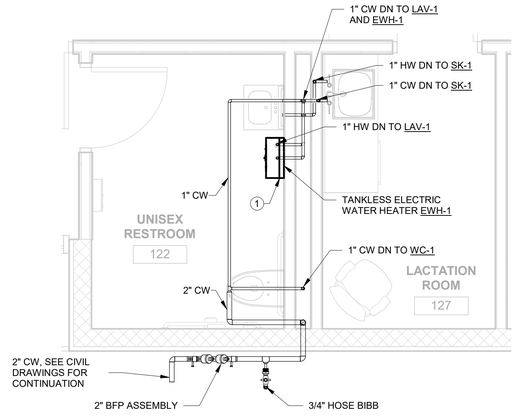


3 PLUMBING FLOOR PLAN - PHASE 1
3/16" = 1'-0"

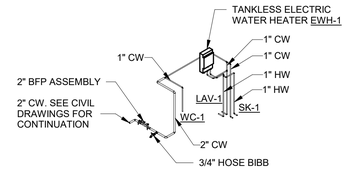


SANITARY ISOMETRIC - PHASE 1

4 DETAIL
– — NTS



2 PLUMBING DOMESTIC WATER ENLARGED PLAN - PHASE 1
P-3 — 3/8" = 1'-0"



WATER ISOMETRIC - PHASE 1

5 DETAIL
– — NTS

PLUMBING NOTES:

1. INSTALL PLUMBING PIPING SHOWN ON THIS DRAWING IN ACCORDANCE WITH CALIFORNIA PLUMBING CODE, 2024 EDITION.
2. INSTALL SANITARY DRAIN PIPING AT 1/4" PER FOOT SLOPE UNLESS OTHERWISE NOTED.
3. ALL PIPING SHOWN WITH DASHED LINETYPE ARE LOCATED UNDERGROUND.

PLUMBING KEY NOTES:

(1) TANKLESS ELECTRIC WATER HEATER EWH-1: PROVIDE AND INSTALL FLEXIBLE HOSE PIPE CONNECTIONS BETWEEN WATER HEATER AND LAVATORY LAV-1. PROVIDE AND INSTALL ALL REQUIRED MOUNTING SUPPORTS TO INSTALL THE WATER HEATER ON A FLOOR PAD.

(2) REMOVE EXISTING 4" WALL CLEANOUT ON EXISTING EXTERIOR WALL. EXTEND EXISTING 4" SAN PIPE TO RUN THROUGH NEW WALL AND TERMINATE WITH NEW 4" WCO.

3/8" = 1'- 0"
2 0 2 4

3/16" = 1'- 0"
4 0 4 8

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

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Revisions

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LICENSED PROFESSIONAL ENGINEER — SAID YASIR IBRAHIM — M 39357 — MECHANICAL — STATE OF CALIFORNIA

5/14/2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

PLUMBING PLANS - PHASE 1

Design by: S. IBRAHIM
Date: MAY 2025
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Date: MAY 2025
Drawn by: G. NITHIYAN
Date: MAY 2025
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Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

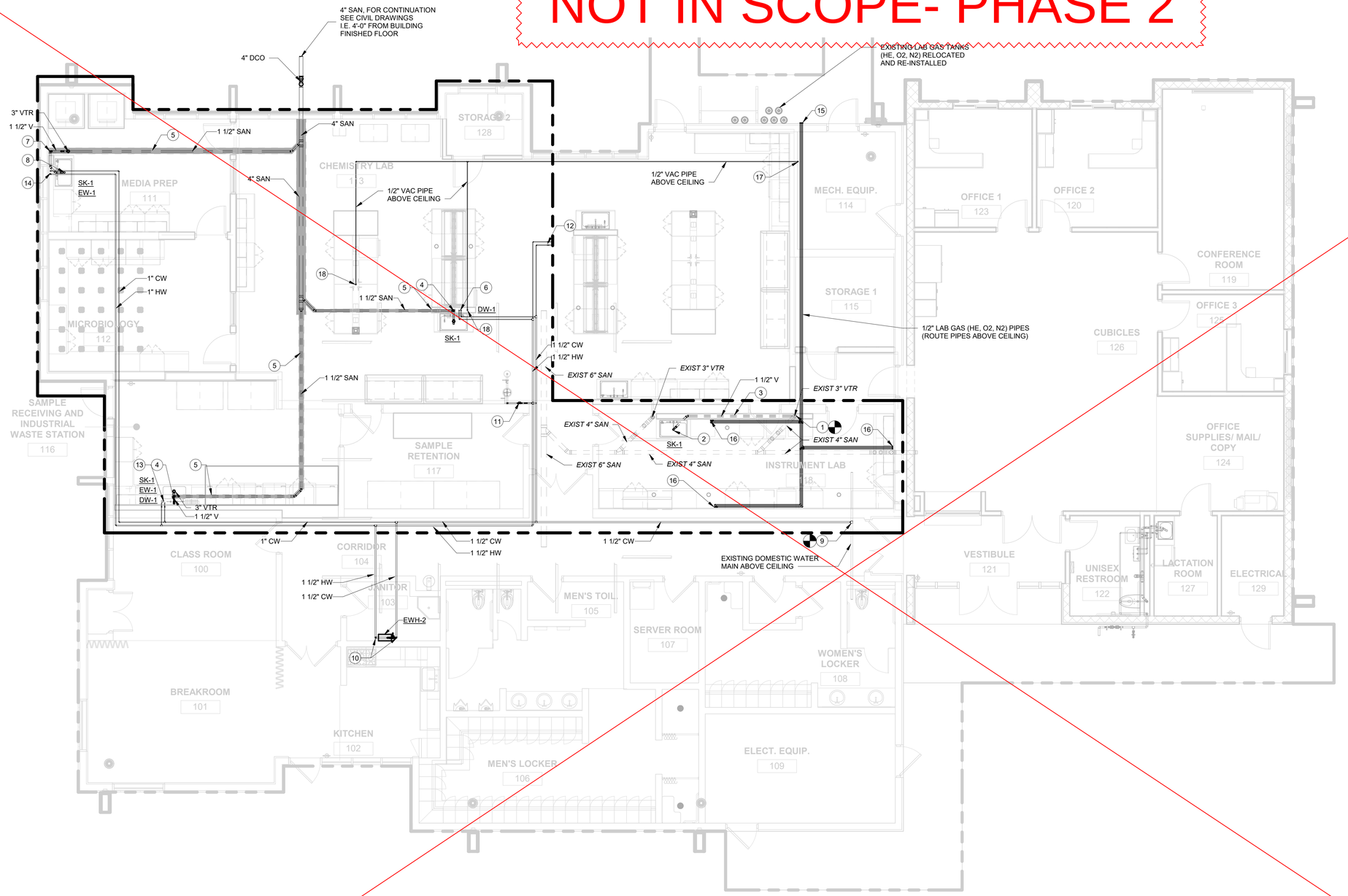
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P-3

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NOT IN SCOPE- PHASE 2



PLUMBING NOTES:

1. INSTALL PLUMBING PIPING SHOWN ON THIS DRAWING IN ACCORDANCE WITH CALIFORNIA PLUMBING CODE, 2024 EDISON.
2. INSTALL SANITARY DRAIN PIPING AT 1/4" PER FOOT SLOPE UNLESS OTHERWISE NOTED.
3. ALL PIPING SHOWN WITH DASHED LINETYPE ARE LOCATED UNDERGROUND.

PLUMBING KEY NOTES:

(1) CONNECT NEW 1 1/2" SAN TO EXISTING 4" SAN.

(2) CONNECT NEW 1 1/2" SAN TO NEW LAB SINK SK-1.

(3) ROUTE NEW 1 1/2" SAN SERVING NEW LAB SINK SK-1 IN NEW PIPE CHASE.

(4) 1 1/2" SAN DN AND 1 1/2" VENT UP FROM LAB SINK THROUGH PIPE CHASE. TRANSITION 1 1/2" VENT UP TO 3" VTR.

(5) CUT EXISTING CONCRETE SLAB AND REPLACE IN KIND TO INSTALL NEW SANITARY DRAIN PIPES. COORDINATE WITH STRUCTURAL. SHADED AREA IS SHOWN ON THIS DRAWING TO IDENTIFY THE EXTEND OF CONCRETE CUT.

(6) 1/2" DOMESTIC COLD WATER AND HOT WATER DN THROUGH PIPE CHASE TO LAB SINK SK-1 AND DISHWASHER DW-1.

(7) 1 1/2" VENT DN TO LAB SINK SK-1.

(8) 1 1/2" SAN DN FROM LAB SINK SK-1.

(9) CONNECT NEW 1 1/2" DOMESTIC WATER PIPE TO EXISTING DOMESTIC WATER MAIN ABOVE CEILING.

(10) 1 1/2" CW AND HW DN AND CONNECT TO TANKLESS ELECTRIC WATER HEATER.

(11) CONNECT 1 1/4" CW AND 1 1/4" HW TO NEW MIXING VALVE SERVING EXISTING EMERGENCY SHOWER AND EYEWASH (ESEW) STATION. BALANCE MIXING VALVE TO DELIVER 85 DEG F TEPID WATER TO THE ESEW.

(12) 1/2" CW AND 1/2" HW VALVED AND CAPPED FOR PHASE 2-B WORK. FOR CONTINUATION SEE PLUMBING DRAWING P-5.

(13) 1/2" DOMESTIC COLD WATER AND HOT WATER DN THROUGH PIPE CHASE TO LAB SINK SK-1, DISHWASHER DW-1 AND EYEWASH EW-1.

(14) 1/2" DOMESIC COLD WATER AND HOT WATER DN THROUGH PIPE CHASE TO LAB SINK - SK-1 AND EYEWASH EW-1.

(15) CONNECT NEW 1/2" LAB GAS PIPES (HE, O2, N2) TO EXISTING LAB GAS STORAGE TANKS.

(16) 1/2" LAB GAS PIPES (HE, O2, N2) DOWN THROUGH CEILING, ROUTE PIPES ALONG WALL AND CONNECT TO LAB GAS (HE, O2, N2) CONNECTION ABOVE LAB TABLE. COORDINATE ACTUAL LAB GAS CONNECTION SIZE AND LOCATION WITH LAB EQUIPMENT SUPPLIER.

(17) CONNECT NEW 1/2" VAC PIPE TO EXISTING VAC PUMP PIPING IN MECH ROOM.

(18) CONNECT 1/2" VAC PIPE TO VAC PIPE NOZZLE LOCATED ON LAB TABLE. COORDINATE ACTUAL VAC PIPE CONNECTION SIZE AND LOCATION WITH LAB EQUIPMENT SUPPLIER.

PLUMBING FLOOR PLAN - PHASE 2-A

3/16" = 1'-0"

3/16" = 1'- 0"
4 0 4 8

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	VN	RC

Revisions

CDM Smith
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Tel: (213) 457-2200

LICENSED PROFESSIONAL ENGINEER — SAID TAAIR IBRAHIM — M 39357 — MECHANICAL — STATE OF CALIFORNIA

5/14/2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

PLUMBING MODIFICATIONS FLOOR PLAN - PHASE 2-A

Design by: S. IBRAHIM
Date: MAY 2025
Checked by: S. GOPIKUMAR
Date: MAY 2025
Drawn by: G. NITHIYAN
Date: MAY 2025
Checked by: S. IBRAHIM
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

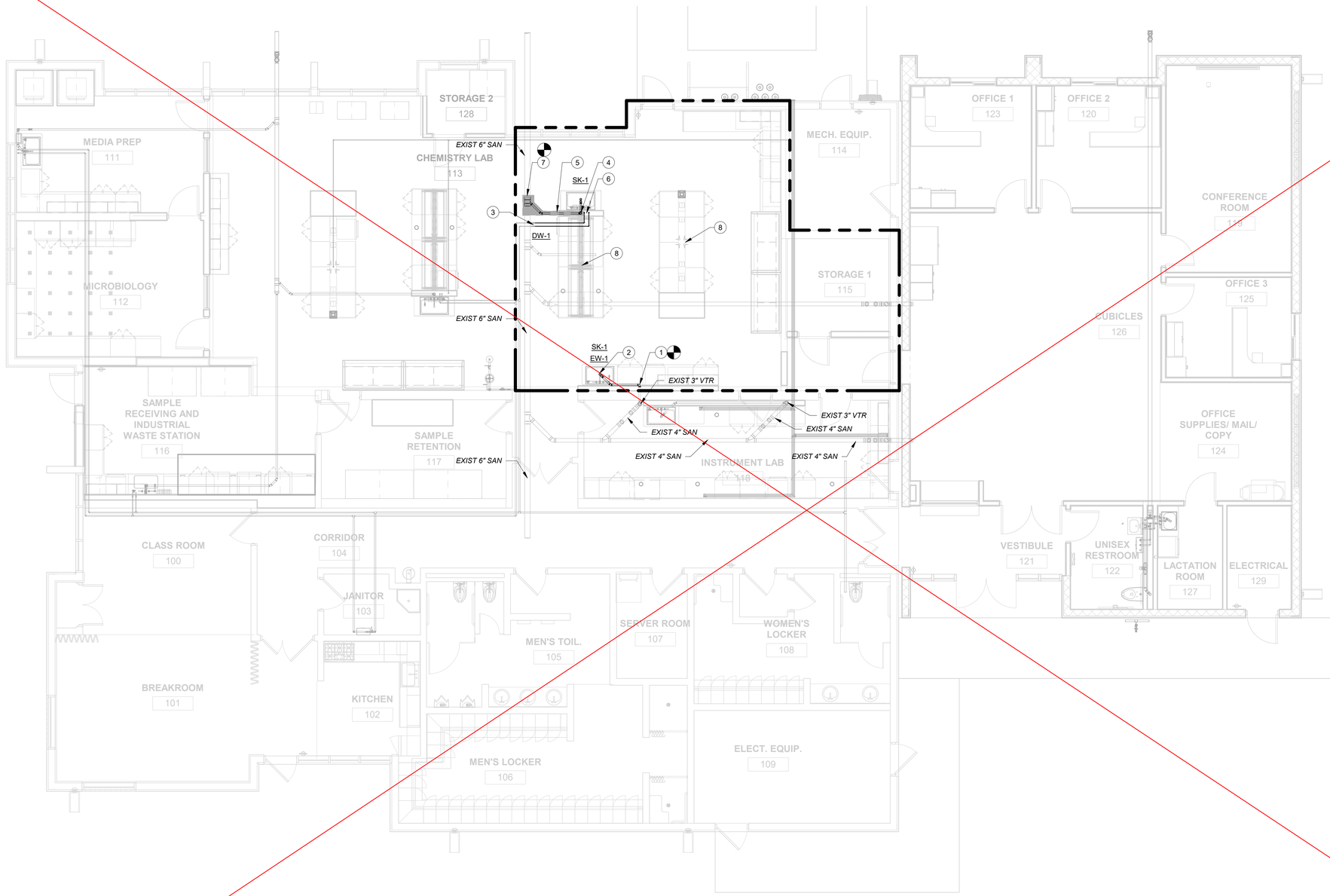
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P-4

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NOT IN SCOPE- PHASE 2



N

PLUMBING NOTES:

1. INSTALL PLUMBING PIPING SHOWN ON THIS DRAWING IN ACCORDANCE WITH CALIFORNIA PLUMBING CODE, 2024 EDITION.
2. INSTALL SANITARY DRAIN PIPING AT 1/4" PER FOOT SLOPE UNLESS OTHERWISE NOTED.
3. ALL PIPING SHOWN WITH DASHED LINETYPE ARE LOCATED UNDERGROUND.

PLUMBING KEY NOTES:

(1) CONNECT NEW 1 1/2" SAN FROM NEW LAB SINK TO EXISTING SANITARY DRAIN.

(2) CONNECT NEW 1 1/2" SAN FROM NEW LAB SINK TO EXISTING SANITARY DRAIN. ROUTE NEW 1 1/2" SAN DRAIN PIPE BELOW SINK COUNTERTOP.

(3) CONNECT 1/2" CW AND 1/2" HW SERVING PHASE 2-B TO 1/2" CW AND 1/2" HW FROM PHASE 2-A.

(4) 1 1/2" SAN DN AND 1 1/2" VENT UP FROM LAB SINK THROUGH PIPE CHASE. TRANSITION 1 1/2" VENT UP TO 3" VTR.

(5) CUT EXISTING CONCRETE SLAB AND REPLACE IN KIND TO INSTALL NEW SANITARY DRAIN PIPES. COORDINATE WITH STRUCTURAL. SHADED AREA IS SHOWN ON THIS DRAWING TO IDENTIFY THE EXTEND OF CONCRETE CUT.

(6) 1/2" DOMESTIC COLD WATER AND HOT WATER DN THROUGH PIPE CHASE TO LAB SINK, CONNECT 1/2" HW TO DISWASHER AND EYEWASH.

(7) CONNECT 1 1/2" SAN DRAIN TO EXISTING 6" SAN DRAIN.

(8) CONNECT 1/2" VAC PIPE TO EXISTING 1/2" VAC PIPE IN PIPE TRENCH AND TO VAC PIPE NOZZLE LOCATED ON LAB TABLE. COORDINATE ACTUAL VAC PIPE CONNECTION SIZE AND LOCATION WITH LAB EQUIPMENT SUPPLIER.

PLUMBING FLOOR PLAN - PHASE 2-B

3/16" = 1'-0"

3/16" = 1'- 0"
4 0 4 8

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

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CITY OF REDLANDS
Municipal Utilities and Engineering Department

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PLUMBING MODIFICATIONS PLAN - PHASE 2-B

Design by: S. IBRAHIM
Date: MAY 2025
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Date: MAY 2025
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Date: MAY 2025
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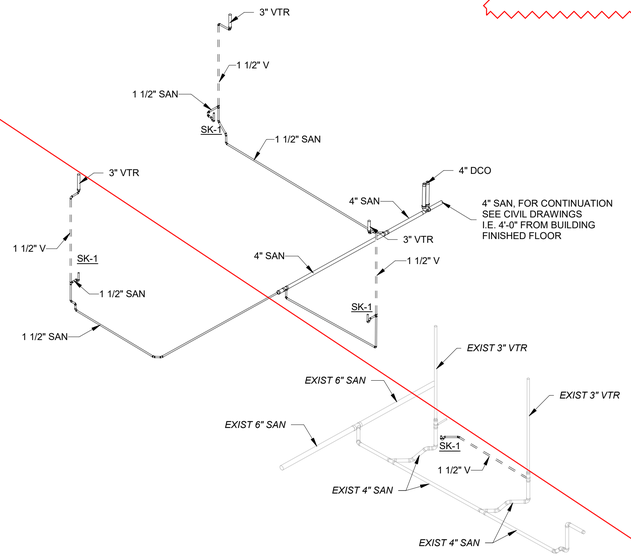
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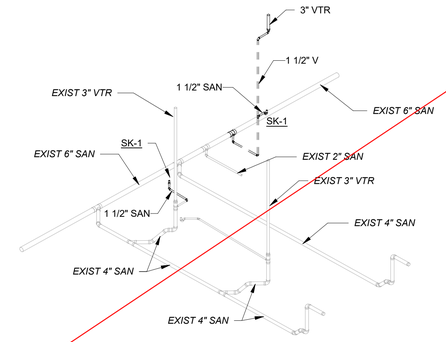
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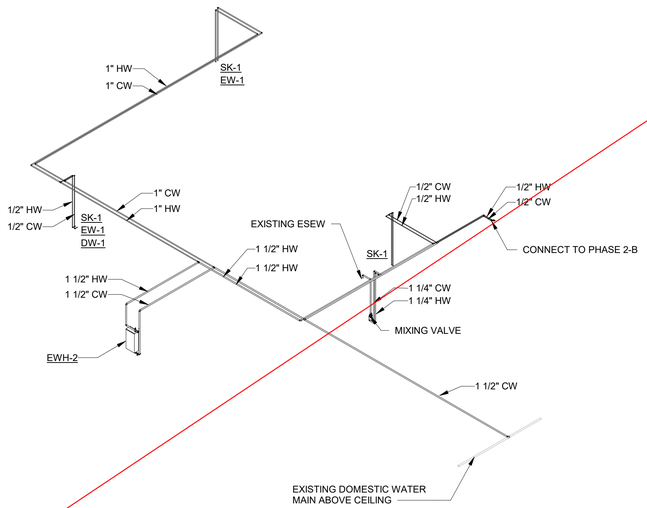
SANITARY ISOMETRIC - PHASE 2-A

1 DETAIL
NTS



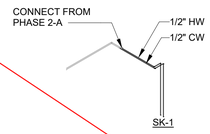
SANITARY ISOMETRIC - PHASE 2-B

3 DETAIL
NTS



WATER ISOMETRIC - PHASE 2-A

2 DETAIL
NTS



WATER ISOMETRIC - PHASE 2-B

4 DETAIL
NTS

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LICENSED PROFESSIONAL ENGINEER
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MECHANICAL
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5/14/2025

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

PLUMBING ISOMETRIC PLANS

BENCHMARK

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ELECTRIC WATER HEATER SCHEDULE

TAG	DESCRIPTION	LOCATION	FLOW (GPM)	TEMPERATURE RISE (F)	HEATER CAPACITY (KW)	ELECTRICAL (VOLT/PHASE/HZ)	MANUFACTURER	MODEL	NOTES
EWH-1	TANKLESS WATER HEATER	UNISEX ADMINISTRATION BUILDING, PHASE 1	0.5	48	3.5	120/1/60	RHEEM	RTX-04	1, 3
EWH-2	TANKLESS WATER HEATER	LAB BUILDING PHASE 2-A AND PHASE 2-B	23	NA	60	460/3/60	STIEBEL ELTRON	CES	2, 3

NOTES:

1. TANKLESS TYPE WATER HEATER, UL 499 CERTIFIED, LEAD FREE NSF CERTIFIED FOR POTABLE WATER USE. PROVIDE WITH EXTERNAL DIGITAL TEMPERATURE DISPLAY AND CONTROL OF OUTLET WATER TEMPERATURE. RATED FOR 150 PSI PRESSURE, 0.3 GPM MIN ACTIVATION FLOW.
2. FACTORY PACKAGED WATER HEATER FOR EMERGENCY DRENCH APPLICATION SPECIFICALLY DESIGNED FOR TEPID WATER DELIVERY TO EMERGENCY SAFETY SHOWER / EYEWASH FIXTURES IN ACCORDANCE WITH ANSI Z358.1.
3. PROVIDE WITH WALL MOUNTING BRACKETS.

PLUMBING FIXTURE SCHEDULE

TAG	PLUMBING FIXTURE	POINT CONNECTION				NOTES
		COLD WATER	HOT WATER	WASTE	VENT	
WC-1	WATER CLOSET (FLUSH VALVE)	1"	-	4"	2"	
LAV-1	LAVATORY	1/2"	1/2"	1 1/2"	1 1/2"	1
SK-1	LAB SINK	1/2"	1/2"	1 1/2"	1 1/2"	1,2
DW-1	DISHWASHER	1/2"	1/2"	1 1/2"	-	2
EW-1	EYEWASH	1/2"	-	-	-	2

NOTES:

1. PROVIDE WITH MIXING VALVE.
2. FIXTURE IS PROVIDED BY OTHERS.

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LICENSED PROFESSIONAL ENGINEER
SAID YASIR IBRAHIM
M 39357
MECHANICAL
STATE OF CALIFORNIA
5/14/2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

PLUMBING SCHEDULES

Design by: S. IBRAHIM
Date: MAY 2025
Checked by: S. GOPIKUMAR
Date: MAY 2025
Drawn by: G. NITHIYAN
Date: MAY 2025
Checked by: S. IBRAHIM
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

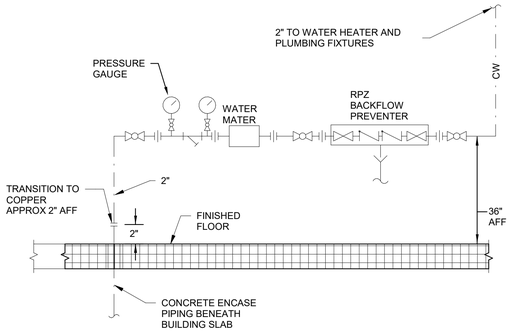
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 98 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

P-7

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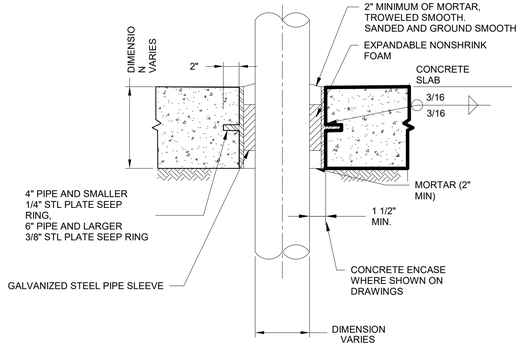
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DOMESTIC COLD WATER

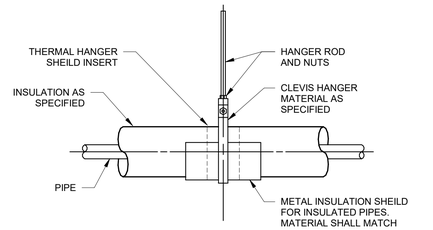
NON POTABLE WATER SERVICE

A DETAIL
NTS



TYPICAL CONCRETE SLAB ON GRADE PIPE PENETRATION

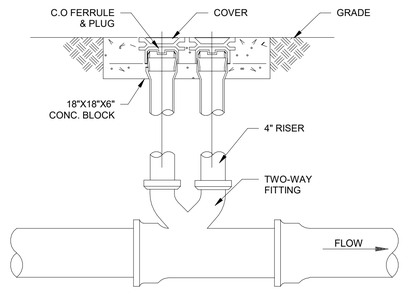
B DETAIL
NTS



NOTES:
1. ALL HANGER RODS, BOLTS, NUTS AND SCREWS SHALL BE STAINLESS STEEL

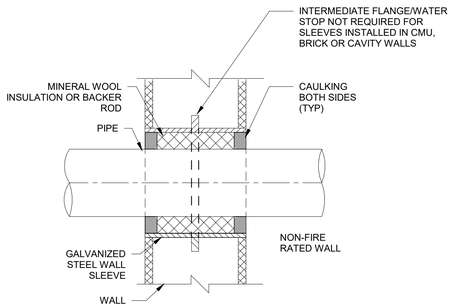
HANGER SUPPORT SYSTEM INSULATED HORIZONTAL PIPING

C DETAIL
NTS

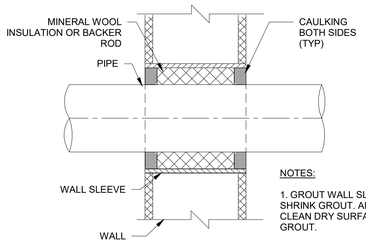


DOUBLE CLEANOUT

D DETAIL
NTS



CONCRETE AND MASONRY WALL PENETRATIONS (GREATER THAN 2"∅)



NOTES:

1. GROUT WALL SLEEVE IN PLACE WITH NON-SHRINK GROUT. APPLY BONDING AGENT TO CLEAN DRY SURFACES BEFORE PLACING GROUT.

CONCRETE AND MASONRY WALL PENETRATIONS (2"∅ AND SMALLER)

NOTES:

1. WALL SLEEVES INSTALLED IN BRICK, CMU OR CAVITY WALLS SHALL BE GROUTED IN PLACE WITH NON-SHRINK GROUT. APPLY BONDING AGENT TO CLEAN DRY SURFACES BEFORE PLACING GROUT

PIPE WALL PENETRATIONS

E DETAIL
NTS

CDM Smith
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LICENSED PROFESSIONAL ENGINEER — SAID YASIR IBRAHIM — M 39357 — MECHANICAL — STATE OF CALIFORNIA

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REFERENCE CODES AND STANDARDS

THE FIRE ALARM SYSTEM SHALL BE PROVIDED IN ACCORDANCE WITH THE FOLLOWING CODES AND STANDARDS:

- 2022 CALIFORNIA BUILDING CODE (CBC)
- 2022 CALIFORNIA FIRE CODE (CFC)
- 2022 CALIFORNIA MECHANICAL CODE (CMC)
- 2023 NATIONAL ELECTRIC CODE (NFPA 70)
- 2022 NATIONAL FIRE ALARM AND SIGNALING CODE (NFPA 72)
- 2022 NFPA 13, STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS
- 2018 NFPA 170, STANDARD FOR FIRE SAFETY AND EMERGENCY SYMBOLS.
- OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA): 29 CCFR PART 1910 – OCCUPATIONAL SAFETY AND HEALTH STANDARDS
- CITY OF REDLANDS MUNICIPAL CODES
- FIRE ALARM EQUIPMENT MANUFACTURER'S RECOMMENDATIONS

FIRE ALARM LEGEND

SYMBOL	DESCRIPTION
FACP	FIRE ALARM AND VOICE EVAC
FTR	FIRE ALARM TRANSPONDER/TRANSMITTER
FAA	FIRE ALARM ANNUNCIATOR PANEL
NAC	ALARM NOTIFICATION EXTENDER PANEL
AMP	VOICE AMPLIFIER PANEL
LOC	LOCAL OPERATING CONSOLE
ANT	ANTENNA
ACC	ACCESS CONTROL PANEL
PIV	POST INDICATOR VALVE
SPD	SURGE PROTECTION DEVICE
SS	SURGE SUPPRESSOR
S	SMOKE DETECTOR IN DUCT, PHOTO
S_P	SMOKE DETECTOR PHOTOELECTRIC
H	HEAT DETECTOR
$_{CO}$	CARBON MONOXIDE DETECTOR
F	MANUAL PULL STATION
AIM	ADDRESSABLE INPUT MONITOR MODULE
AOM	ADDRESSABLE OUTPUT CONTROL MODULE
$_{RTS}$	REMOTE ALARM INDICATING AND TEST SWITCH
TS	TAMPER SWITCH
FS	FLOW SWITCH
	WATER FLOW ALARM BELL (ELECTRIC)
CD	COMBINATION HORN/STROBE CD: CANDELA RATING
CD W	COMBINATION SPEAKER/STROBE CD: CANDELA RATING, W:WATTAGE
CD	VISIBLE ONLY (STROBE) WALL MOUNT CD: CANDELA RATING
CD	VISIBLE ONLY (STROBE) CEILING MOUNT CD: CANDELA RATING
JB	FIRE ALARM JUNCTION BOX
-WW-	END OF LINE RESISTOR

SCOPE OF WORK

EXTEND THE EXISTING FIRE ALARM SYSTEM INTO THE NEW EXPANSION AREAS FOR A CONSISTENT SYSTEM THROUGHOUT THE LAB BUILDING. ADD NEW, AND REMOVE AND RELOCATE THE EXISTING DETECTION AND NOTIFICATION EQUIPMENT IN THE NEW AND EXISTING WORK AREAS TO PROVIDE PROPER COVERAGE PER NEW CEILING LAYOUT, NEW ROOM DIMENSIONS, AND AREAS SPACINGS AS INDICATED ON THE SUPPLIED DRAWINGS. RELOCATE THE EXISTING FIRE ALARM PANEL AND TERMINAL BLOCK TO THE NEW LOCATION AS INDICATED ON THE PLANS. RELOCATE THE EXISTING FIRE ALARM ANNUNCIATOR PANEL TO THE NEW ENTRY LOBBY. RELOCATE EXISTING DETECTION AND NOTIFICATION DEVICES FROM EXISTING DEMOLISHED CEILING TO THE NEW CEILING. REROUTE THE EXISTING WIRING AND RACEWAYS TO ACCOMMODATE FOR NEW AND RELOCATED DEVICES. ADD BUILDING OCCUPANT NOTIFICATION SYSTEM PER SUPPLIED DRAWINGS. PROVIDE WIRING AND TERMINATION TO NEW DUCT SMOKE DETECTORS (PROVIDED BY AC UNITS MANUFACTURER) AS WELL AS REMOTE TEST AND INDICATION KEYED SWITCH DEVICES. ADD A NEW SMOKE DETECTOR IN THE CLOSE PROXIMITY TO THE FACP. ADD NAC EXTENDER(S) AND INCREASE THE BATTERY BACKUP CAPACITY IF REQUIRED FOR THE EXPANDED NEW SYSTEM TO ADDRESS NEW NOTIFICATION CIRCUITS. COMPLY WITH SUPPLIED FIRE ALARM SPECIFICATIONS.

ABBREVIATIONS

AC	ABOVE CEILING
AFF	ABOVE FINISHED FLOOR
AHJ	AUTHORITY HAVING JURISDICTION
ALM	ALARM
ANN	ANNUNCIATOR
BTV	BUTTERFLY VALVE
cD	CANDELA RATING
dBA	DECIBEL A SCALE
DET	DETECTOR
E	EXISTING TO REMAIN
EMT	ELECTRIC METAL TUBING
EOL	END OF LINE
EPO	EMERGENCY POWER OFF
FAA	FIRE ALARM ANNUNCIATOR
FACP	FIRE ALARM CONTROL PANEL
FATC	FIRE ALARM TERMINAL CABINET
FBO	FURNISHED BY OTHERS
FCC	FIRE COMMAND CENTER
FTR	FIRE ALARM TRANSPONDER
HT	HEIGHT
JB	JUNCTION BOX
MAX	MAXIMUM
MIN	MINIMUM
N	NEW
N/A	NOT APPLICABLE
NAC	NOTIFICATION APPLIANCE CIRCUIT
NDU	NETWORK DISPLAY UNIT
NEC	NATIONAL ELECTRIC CODE
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
NPU	NETWORK PROCESSING UNIT
NTS	NOT TO SCALE
OS&Y	OUTSIDE SCREW AND YOKE
RMC	RIGID METALLIC CONDUIT
SCC	STATUS COMMAND CENTER
SLC	SIGNALING LINE CIRCUIT
SMK	SMOKE
SUPV	SUPERVISORY
TRBL	TROUBLE
TS	TAMPER SWITCH
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
VCC	VOICE COMMAND CENTER
W	WATTAGE
W/	WITH
W/O	WITHOUT
WF	WATERFLOW
WG	WIRE GUARD
WP	WEATHERPROOF

SIGNALING LINE CIRCUIT CALL-OUT LEGEND

SAMPLE: PT#

PT # — # DEVICE ZONE #; PT ZONE POINT

NOTIFICATION DEVICE CALL-OUT LEGEND

SAMPLE: 1N1-1

N# -# — # POWER SOURCE / SUPPLY#; N# NAC CIRCUIT #; -# DEVICE

FIRE ALARM CONDUIT SCHEDULE

SYMBOLS	DESCRIPTION	CONDUIT SIZE
——SLC——	SLC CABLE	E 3/4"
—SLC,P——	SLC AND POWER CABLES	E 3/4"
—— A ——	AUDIO CABLE	E 3/4"
—— A,V ——	AUDIO AND STROBE CABLE	E 3/4"
—— 2V ——	TWO STROBE CABLE	E 3/4"
—2A,2V——	TWO AUDIO AND TWO STROBE CABLE	E 1"
—4A,SYN,P—	FOUR AUDIO SYNCH AND POWER CABLE	E 1"
— SYN,P——	SYNCH AND POWER CALBE	E 3/4"
— P,PNL——	POWER, PANEL CABLE	E 3/4"
—— IDC——	IDC CABLE	E 3/4"
—— ANT——	ANTENNA CABLE	E 3/4"

FIRE ALARM WIRE SCHEDULE

CABLE TAG	CRKT ABBR	CIRCUIT TYPE	CABLE IN CONDUIT
D	SLC	SIGNAL LINE CIRCUIT+SPR	FPLR #14–4 THHN/THWN
A–N	A	AUDIO CIRCUIT	FPLR #14–2 SHIELDED THHN/THWN
V–N	V	VISUAL CIRCUIT	FPLR #14–4 THHN/THWN
D	SYN	SYNCHRONIZATION WIRE	FPLR #16–4 THHN/THWN
P	P	24VDC AUX POWER	FPLR #14–2 THHN/THWN
–	PNL	PANEL CIRCUIT	FPLR #16–4 & 16–2 THHN/THWN
D	IDC	INITIATING DEVICE CIRCUIT	FPLR #14–2 THHN/THWN
–	ANT	ANTENNA COAX	50–ohm mini RG–8X

FIRE ALARM CONDUIT FILL CHART

CONDUIT THREAD SIZE	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
INTERNAL DIAM./mm	15.8	20.9	26.6	35.1	40.9	52.5	69.4	85.2
TOTAL AREA SQ./mm	196	343	556	968	1314	2165	3783	5701
40% AREA SQ.mm	78	137	222	387	526	866	1513	2280

FIRE ALARM CONDUIT WIRE FILL CHART

CONDUIT THREAD SIZE		1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
	WIRE GAUGE ↓	MAXIMUM CONDUCTERS ↓							
	18	19	34	55	97	132	216	--	--
WIRE TYPE ↓	16	15	26	43	76	104	169	--	--
FPL	14	13	24	39	69	94	154	--	--
FPLR	12	10	18	29	51	70	114	164	--
THHN,THWN	10	6	10	18	32	44	73	104	160
	8	3	5	9	16	22	36	51	79

NOTES

- THESE PLANS ARE FOR REFERENCE ONLY AND SHOWING THE PERFORMANCE REQUIREMENTS OF THE SYSTEM.
- A SEPARATE SUBMITTAL / PERMIT IS REQUIRED FOR THE FIRE ALARM SYSTEMS.

GENERAL NOTES

1. INSTALLATION, OPERATION, AND MAINTENANCE OF THE FIRE ALARM SYSTEM MUST BE IN ACCORDANCE WITH NFPA 72 STANDARD AND MANUFACTURER'S SPECS.
2. CLASS B, CONVENTIONAL FIRE ALARM SYSTEM SHALL BE PROVIDED.
3. ALL CONDUCTORS MUST BE INSTALLED IN CONDUIT (EMT MINIMUM).
4. EQUIPMENT THAT IS UL LISTED AND FM APPROVED SHALL BE INSTALLED AND USED IN ACCORDANCE WITH ANY INSTRUCTIONS INCLUDED IN THE LISTING OR LABELING.
5. ALL CONDUIT SHALL BE IN MINIMUM ¾" UNLESS NOTED OTHERWISE.
6. PULL ALL CONDUCTORS SPLICE FREE; CONDUCTORS MUST BE CONTINUOUS FROM DEVICE TO DEVICE. THE USE OF WIRE NUTS, CRIMPED CONNECTORS, OR TWISTING OF CONDUCTORS IS PROHIBITED.
7. ALL CONDUCTORS SHALL BE COPPER.
8. CONDUIT FOR THE FIRE ALARM SYSTEM SHALL BE COMPLETELY INDEPENDENT OF ALL OTHER WIRING.
9. AUDIBLE DEVICES SHALL BE WIRED INDEPENDENTLY FROM VISUAL DEVICES.
10. SILENCING OF AUDIBLE DEVICES SHALL NOT DE–ACTIVATE FLASHING STROBES UNTIL ALARM CONDITION IS CLEARED.
11. ALL CONDUITS SHALL BE ROUTED PERPENDICULAR AND PARALLEL TO BUILDING STRUCTURE. CONCEAL CONDUIT AS MUCH AS POSSIBLE. USE EXPOSED CONDUITS ONLY IN UNFINISHED SPACES AND ELECTRICAL/MECHANICAL ROOMS.
12. IN UNFINISHED AREAS, ALL CONDUIT, JUNCTION/BACK BOXES, COVERS, AND COUPLINGS, WHEN PROVIDED, MUST BE FACTORY PAINTED RED.
13. CONTRACTOR SHALL FIELD DETERMINE EXACT LOCATIONS OF THE FIRE ALARM DEVICES BASED ON ACTUAL FIELD CONDITIONS. COORDINATE WITH OTHER TRADES.
14. AUDIBLE ALARM SHALL PRODUCE A SOUND THAT EXCEEDS THE PREVAILING EQUIVALENT SOUND LEVEL IN THE ROOM OR SPACE BY AT LEAST 15dBA OR EXCEEDS ANY MAXIMUM SOUND LEVEL A DURATION OF 60 SECONDS BY 5dBA, WHICHEVER IS LOUDER.
15. SOUND LEVELS FOR ALARM SIGNALS SHALL NOT EXCEED 110dBA.
16. PROVIDE SURGE SUPPRESSION (SPD) FOR ALL INDICATING DEVICE CIRCUITS, OR NOTIFICATION APPLIANCE CIRCUITS THAT LEAVE OR ENTER A FACILITY'S EXTERIOR ENCLOSURE.
17. PROVIDE SPD ON ALL 120 VAC CIRCUITS TO CONTROL PANELS, SUBPANELS, TRANSMITTERS, AMPLIFIER PANELS, AND BOOSTER PANELS. SPD MUST HAVE BOTH A UL 1449 AND UL 1283 LISTING AND MUST BE LOCATED IN AN ADJACENT HINGED TERMINAL BOX.
18. METAL BOXES SHALL BE GROUNDED AND BONDED IN ACCORDANCE WITH PARTS I, IV, V, VI, VII, AND X OF ARTICLE 250 AS APPLICABLE, EXCEPT AS PERMITTED IN SECTION 250.112(I) NEC.
19. CABLE SPLICES AND TERMINATIONS OF POWER–LIMITED FIRE ALARM CONDUCTORS MUST BE MADE IN LISTED FITTINGS, BOXES, ENCLOSURES, FIRE ALARM DEVICES, OR UTILIZATION EQUIPMENT (110.3(B) AND 300.15).
20. THE LOCATION OF THE BRANCH–CIRCUIT OVER–CURRENT DEVICE MUST BE PERMANENTLY IDENTIFIED AT THE FIRE ALARM CONTROL UNIT(760.121(B)).
21. FIRE ALARM CIRCUITS MUST BE IDENTIFIED AT TERMINAL AND JUNCTION LOCATIONS (NEC 760–30).
22. THE BATTERIES FOR THE FACP SYSTEM SHALL HAVE SUFFICIENT CAPACITY TO OPERATE THE SYSTEMS FOR A MINIMUM OF 24 HOURS UNDER SUPERVISORY CONDITION AND ALL ALARM DEVICES FOR AN ADDITIONAL 15 MINUTES.
23. INSTALLATION OF THE FIRE ALARM SYSTEM SHALL NOT START UNTIL DETAILED PLANS AND SPECIFICATIONS HAVE BEEN APPROVED BY AHJ.
24. DETECTORS SHALL NOT BE INSTALLED UNTIL THE CLEANUP OF ALL TRADES IS COMPLETED AND FINAL (NFPA 72 SECTION 17.7.2.3).
25. BEFORE REQUESTING FINAL APPROVAL OF THE INSTALLATION, THE INSTALLING CONTRACTOR SHALL FURNISH A STATEMENT TO AHJ TO THE EFFECT THAT THE SYSTEM HAS BEEN INSTALLED IN ACCORDANCE WITH APPROVED PLANS AND COMPLETELY TESTED IN ACCORDANCE MANUFACTURER'S SPECIFICATIONS AND APPROPRIATE NFPA REQUIREMENTS. (NFPA 72 SECTION 7.5.2).
26. UPON COMPLETION OF THE INSTALLATION OF THE FIRE ALARM SYSTEM, A SATISFACTORY TEST OF THE SYSTEM SHALL BE MADE IN THE PRESENCE OF THE AHJ.

DELEGATED DESIGN STATEMENT:

THE FIRE ALARM DRAWINGS REPRESENT A PERFORMANCE SPECIFICATION FOR THE FINAL FIRE ALARM SYSTEM. THE FIRE ALARM CONTRACTOR SHALL SUBMIT A COMPLETE INSTALLATION DRAWING PACKAGE INCLUDING ALL CALCULATIONS AND PRODUCT DATA FOR REVIEW AND APPROVAL AS A DEFERRED SUBMITTAL TO ALL REQUIRED REVIEWING AUTHORITIES. INSTALLATION DRAWING PACKAGE SHALL INCLUDE SEALED SHOP DRAWINGS AND VOLTAGE DROP AND BATTERY BACKUP CALCULATIONS INDICATING THE ALARM SYSTEM LAYOUT FINAL DETECTION, NOTIFICATION, AND INTERCONNECTION LOCATIONS. ALL DOCUMENTS ARE TO BE REVIEWED AND SIGNED AND SEALED BY A LICENSED ENGINEER CERTIFIED IN THE STATE OF CALIFORNIA.

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R–13 BM

ELEVATION = 1197.40'

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A	ADDENDUM 1	08/15	PV	JG

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CDM Smith
600 Wilshire Blvd #750
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER — PATRICK VELDENAN — No. FP1968 Exp. 03.31.26 — FIRE PROTECTION — STATE OF CALIFORNIA

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT
PROJECT No. 521028

GENERAL NOTES AND LEGEND

Designed by: P.VELDENIAN
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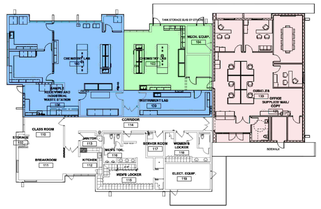
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CONSTRUCTION SEQUENCE PLAN

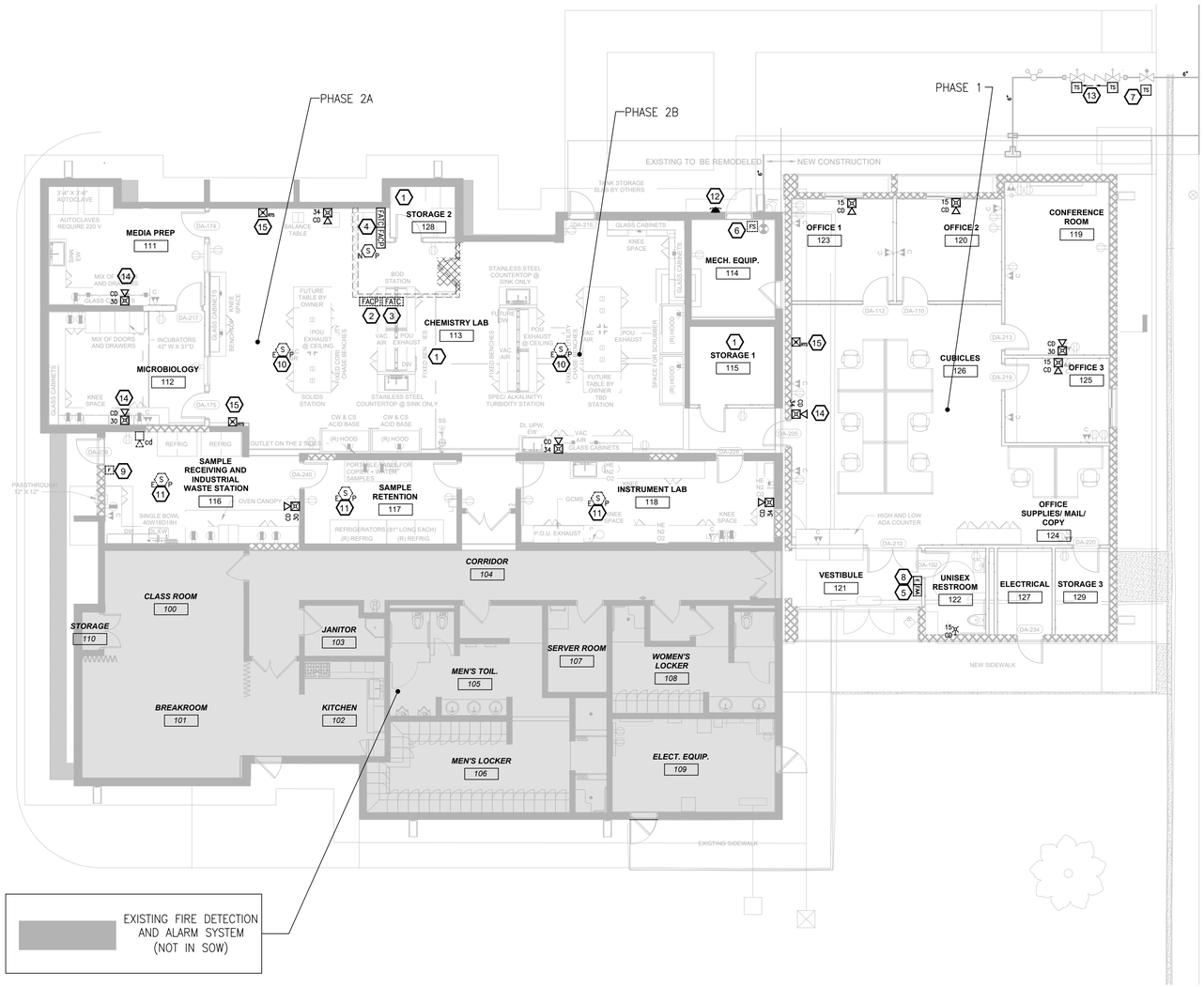
CONSTRUCTION SEQUENCE

PHASE 1
BUILD THE OFFICE EXPANSION AND MOVE ADMINISTRATIVE STAFF INTO THE OFFICE WING. THIS INCLUDES FLEX SPACE FOR LABORATORY TECHNICIANS.

PHASE 2A
CONTRACT FOR CONSTRUCTION FOR THE MICROBIOLOGY AND MEDIA PREPARATION LABORATORIES AND NUTRI-MANTATION ROOM. THE CONTRACTOR WILL HAVE FULL ACCESS TO THE WEST SIDE OF THE LABORATORY, INCLUDING ENTRY FROM THE EXISTING LOBBY. TO RENOVATE WHILE THE EXISTING EAST LABORATORY AREA MAINTAINS OPERATIONS WITH ACCESS FROM THE SOUTH CORRIDOR AND NEW OFFICE EXPANSION.

PHASE 2B
MOVE ALL LABORATORY OPERATIONS INTO THE NEWLY RENOVATED WEST LABORATORY AREA AND RENOVATE THE EAST LABORATORY AREA.

EXISTING - NOT IN SCOPE



FIRE ALARM PLAN

SCALE: 1'= 1/8"

1/8" = 1'- 0"
4 2 0 4 8

GENERAL NOTES

1. THE FIRE ALARM CONTRACTOR SHALL COORDINATE THE LOCATION AND ELEVATION OF ALL NOTIFICATION AND DETECTION DEVICES WITH ALL TRADES. NO FIRE ALARM EQUIPMENT SHALL BE INSTALLED WITHOUT COORDINATED SHOP DRAWINGS. CONFLICTS DUE TO INSTALLATION SHALL BE IDENTIFIED AND CORRECTIONS MADE DURING THE SHOP DRAWING PROCESS.

PLAN NOTES

1. ADD, REMOVE, AND RELOCATE EXISTING AUTOMATIC FIRE DETECTION DEVICES TO PROVIDE PROPER COVERAGE AT THE INDICATED AREAS.
2. (E) SK-5208 FIRE ALARM CONTROL PANEL. RELOCATE TO THE NEW "STORAGE 2" WEST WALL.
3. (E) FIRE ALARM TERMINAL CABINET. RELOCATE TO THE NEW "STORAGE 2" WEST WALL. SEE NOTE 4 BELOW.
4. RELOCATED FIRE ALARM PANEL AND TERMINAL CABINET.
5. MOVE (E) FIRE ALARM REMOTE ANNUNCIATION PANEL TO THE INDICATED LOCATION.
6. (E) FLOW SWITCH ON SPRINKLER RISER TO REMAIN.
7. REPLACE (E) TAMPER SWITCH ON RELOCATED PIV WITH NEW AND REWIRE BACK TO FIRE ALARM SYSTEM. SEE ELECTRICAL PLANS FOR DETAILS.
8. (N) MANUAL FIRE ALARM BOX.
9. (E) MANUAL FIRE ALARM BOX TO REMAIN.
10. REPLACE (E) SMOKE DETECTORS WITH NEW AND PROVIDE PROPER COVERAGE.
11. REPLACE (E) SMOKE DETECTORS WITH NEW AND INSTALL ON THE NEW CEILING. MAINTAIN A PROPER COVERAGE PER NFPA 72.
12. (E) ELECTRIC FIRE ALARM BELL TO REMAIN.
13. FURNISH AND INSTALL TWO (2) NEW TAMPER SWITCHES FOR THE NEW BACKFLOW DEVICE. PROVIDE WIRING BACK TO ALARM SYSTEM.
14. (N) MULTI-CANDELA FIELD SELECTABLE HORN-STROBE NOTIFICATION.
15. (N) DUCT DETECTOR REMOTE TEST AND INDICATING KEYED-SWITCH.

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Date: MAY 2025

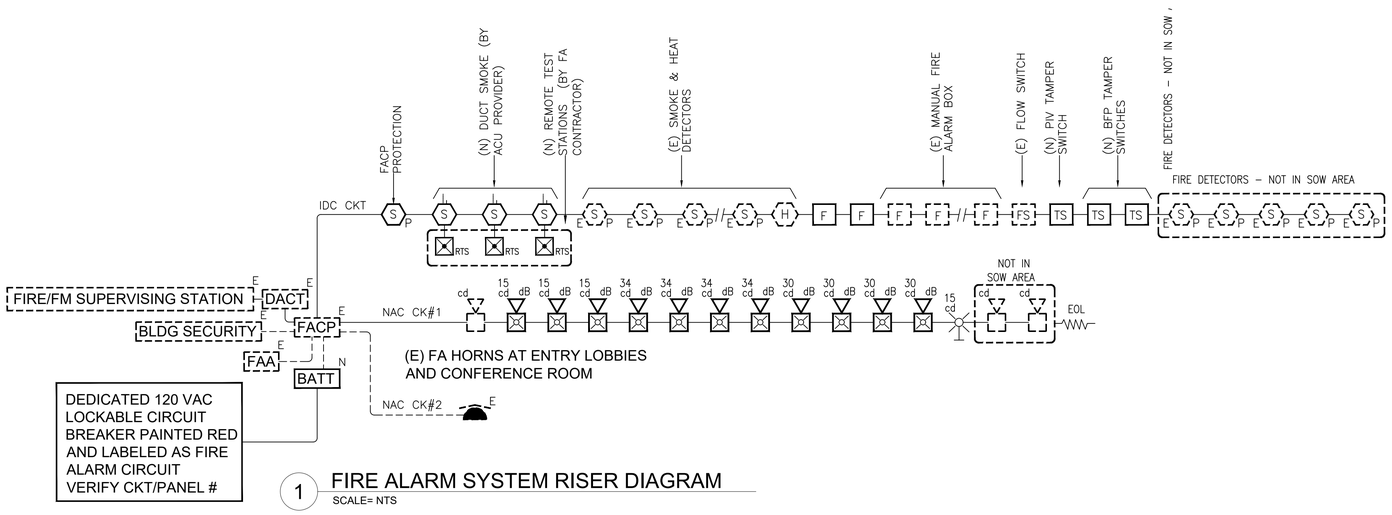
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 101 of 126 Sheets
Scale Horiz. 1"=1/8"
Vert. 1"=1/8"

FA-2

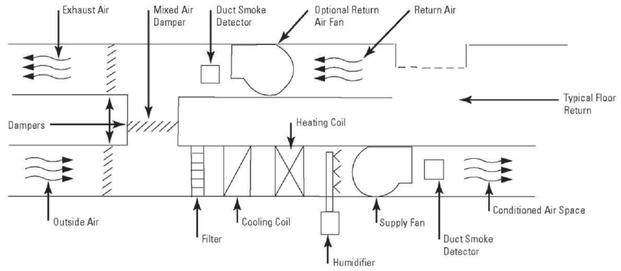
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1 FIRE ALARM SYSTEM RISER DIAGRAM
SCALE= NTS

FOR SYSTEM CFM LARGER THAN 2000 DUCT SMOKE DETECTOR IS REQUIRED AT EACH LOCATION PRIOR TO THE CONNECTION TO A COMMON RETURN AND PRIOR TO ANY RECIRCULATION OR FRESH AIR INLET CONNECTION IN AIR RETURN SYSTEMS SERVING MORE THAN ONE STORY.



2 DUCT SMOKE DETECTOR LOCATION DIAGRAM
SCALE= NTS

SYSTEM OUTPUTS

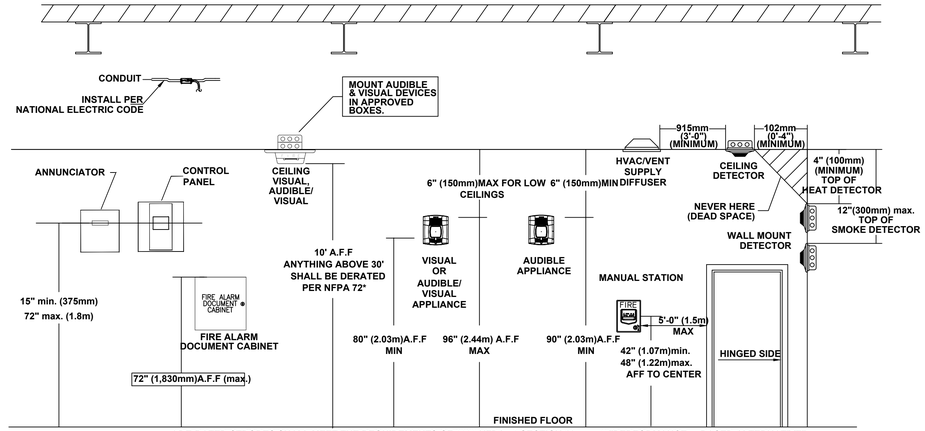
SYSTEM INPUTS				A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
GENERAL FIRE ALARM SYSTEM	TYPICAL ALL LOCATIONS WHERE APPLIED	1	MANUAL PULL STATIONS	●	●					●	●	●	●				●		-	-	-
		2	SMOKE DETECTOR FOR FA PANEL PROTECTION	●	●					●	●	●	●				●		-	-	-
		3	DUCT SMOKE DETECTOR			●	●				●			●		●			-	-	-
		4	SPRINKLER WATER FLOW SWITCH	●	●					●	●	●	●						●	-	-	-
		5	WATER SUPPLY CONTROL VALVE SUPERVISORY SWITCH			●	●				●			●						-	-	-
		6	FIRE ALARM SYSTEM AC POWER FAILURE					●	●		●				●					-	-	-
		7	FIRE ALARM SYSTEM LOW BATTERY					●	●		●				●					-	-	-
		8	FIRE ALARM SYSTEM OPEN CIRCUIT					●	●		●				●					-	-	-
		9	FIRE ALARM SYSTEM GROUND FAULT					●	●		●				●					-	-	-
		10	FIRE ALARM SYSTEM BATTERY DISCONNECT					●	●		●				●					-	-	-
		11	NOTIFICATION APPLIANCE SHORT CIRCUIT					●	●		●				●					-	-	-
				A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R

REQUIRED FIRE SAFETY CONTROL

CONTROL UNIT ANNUNCIATOR | NOTIFICATION | SUPPLEMENTARY

ACTUATE COMMON ALARM SIGNAL INDICATOR
ACTUATE AUDIBLE ALARM SIGNAL
ACTUATE COMMON SUPERVISORY SIGNAL INDICATOR
ACTUATE AUDIBLE SUPERVISORY SIGNAL
ACTUATE COMMON TROUBLE SIGNAL INDICATOR
ACTUATE AUDIBLE COMMON TROUBLE SIGNAL
ACTUATE ZONE OR DEVICE ADDRESS ALARM INDICATOR
DISPLAY AND PRINT CHANGE OF STATUS AND TIME OF INITIATING DEVICE
PRINT FIRE ALARM SIGNAL TO SUPERVISORY STATION
INITIATE FIRE ALARM HORN AND STROBE NOTIFICATION APPLIANCES
TRANSMIT SUPERVISORY SIGNAL TO SUPERVISING STATION
TRANSMIT TROUBLE SIGNAL TO SUPERVISING STATION
SHUTDOWN AIR HANDLING EQUIPMENT
ACTIVATE EXTERIOR STROBES AT FIRE DEPARTMENT RESPONSE POINT
ACTIVATE EXTERIOR HORN/BELL AT SPRINKLER RISER ROOM
—
—
—

3 FIRE ALARM SYSTEM INPUT/OUTPUT MATRIX
SCALE= NTS



* DE-RATED STROBES SHALL MEET THE REQUIREMENTS OF 2022 NFPA 72 SECTION 18.5.5.7.6 "PERFORMANCE - BASED ALTERNATIVE".

4 NFPA FIRE ALARM AND ADA DEVICE MOUNTING ELEVATIONS
SCALE= NTS

CDM Smith
600 Wilshire Blvd #750
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER PATRICK VELDENIAN No. FP1968 Exp. 03.31.26 FIRE PROTECTION STATE OF CALIFORNIA

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R=13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
	Revisions			

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT PROJECT No. 521028

RISER DIAGRAM & SYSTEM I/O MATRIX

Designed by: P.VELDENIAN
Date: MAY 2025
Checked by: J.J.GASS
Date: MAY 2025
Drawn by: P.VELDENIAN
Date: MAY 2025
Checked by: J.J.GASS
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 102 of 126 Sheets
Scale Horiz. NTS
Vert. NTS

FA-3

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FIRE SPRINKLER LEGEND

SYMBOL	DESCRIPTION
-	NOTE CALLOUT
- / -	DETAIL CALLOUT – NUMBER ON TOP DENOTES DETAIL NUMBER – NUMBER ON BOTTOM DENOTES SHEET DETAIL IS SHOWN
-	NODE USED IN HYDRAULIC CALCULATION
[+XX'-X"]	FIRE SPRINKLER PIPE ABOVE FINISHED FLOOR. SEE PLAN FOR ELEVATION.
XX'-X"	CEILING HEIGHT
F	NEW PIPE
E	EXISTING PIPE
	DEMOLISHED PIPE/EQUIPMENT
	THRUST BLOCK
NS	NONSPRINKLERED SPACE
AS	FULLY SPRINKLERED SPACE
	FIRE SPRINKLER RISER
	POST–INDICATOR VALVE
	OS&Y VALVE
P	INDICATING BUTTERFLY VALVE
	CHECK VALVE
	BACKFLOW PREVENTER
TS	VALVE TAMPER SWITCH
PS	ALARM PRESSURE SWITCH
FS	ALARM FLOW SWITCH
	PUBLIC FIRE HYDRANT, TWO HOSE OUTLETS
	PUBLIC FIRE HYDRANT, TWO HOSE OUTLETS AND PUMPER CONNECTION
	SIAMESE FIRE DEPARTMENT CONNECTION
	FREESTANDING SIAMESE FIRE DEPT CONNECTION
	UPRIGHT SPRINKLER
	UPRIGHT SPRINKLER, ON SPRIG
	PENDENT SPRINKLER; ON DROP NIPPLE
	SPRINKLER, WITH GUARD
	LATERAL BRACE
	LONGITUDINAL BRACE
	FOUR–WAY BRACE

FIRE SPRINKLER LEGEND (CONT.)

SYMBOL	DESCRIPTION
	WIRE, SURGE RESTRAINER
	PIPE HANGER
	MECHANICAL PIPE COUPLING
	CHANGE IN PIPE ELEVATION
	ELBOW FACING DOWN
	ELBOW FACING UP
	TEE FACING DOWN
	TEE FACING UP
	PIPE END CAP

REFERENCE CODES AND STANDARDS

THE FIRE SUPPRESSION SYSTEM SHALL BE PROVIDED IN ACCORDANCE WITH THE FOLLOWING CODES AND STANDARDS:

- 2022 CALIFORNIA BUILDING CODE (CBC)
- 2022 CALIFORNIA FIRE CODE (CFC)
- 2022 CALIFORNIA MECHANICAL CODE (CMC)
- 2023 NATIONAL ELECTRIC CODE (NFPA 70)
- 2022 NATIONAL FIRE ALARM AND SIGNALING CODE (NFPA 72)
- 2022 NFPA 13, STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS
- 2022 NFPA 24, STANDARD FOR THE PRIVATE SERVICE MAINS AND THEIR APPURTENANCES
- 2018 NFPA 170, STANDARD FOR FIRE SAFETY AND EMERGENCY SYMBOLS.
- OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA): 29 CCFR PART 1910 – OCCUPATIONAL SAFETY AND HEALTH STANDARDS
- CITY OF REDLANDS MUNICIPAL CODES
- FIRE SPRINKLER EQUIPMENT MANUFACTURER'S RECOMMENDATIONS

SCOPE OF WORK

EXPAND THE EXISTING WET SPRINKLER SYSTEM INTO THE NEW BUILDING AREAS. REMODEL THE EXISTING SPRINKLER SYSTEM IN THE INDICATED AREAS PER NEW CEILING ARRANGEMENT, ROOM DIMENSIONS, AREAS EXPANSIONS, AND WALL ALTERATIONS. ADD, REMOVE, AND RELOCATE SPRINKLER DROPS TO ACCOMMODATE NEW SPRINKLER SYSTEM DESIGN PER INDICATED HAZARD CLASSIFICATION AND NFPA 13 REQUIREMENTS. DEMOLISH AND REMOVE THE EXISTING BACKFLOW PREVENTION DEVICE AND ASSOCIATED TAMPER SWITCHES, AND REPLACE WITH A NEW WATTS DCDA – ES–774DCDA. FURNISH AND INSTALL PIPE, SPRINKLER HEADS, HANGERS, SUPPORT, SEISMIC BRACING, PRESSURE RELIEF VALVE (TEST AND DRAIN CONNECTION PER DETAILS), AUTOMATIC AIR VENT, AND ALL ITEMS REQUIRED FOR A COMPLETE EXPANSION AND REMODELING WORK AND A FULLY FUNCTIONAL AND HYDRAULICALLY CALCULATED AUTOMATIC FIRE SPRINKLER SYSTEM, AS SHOWN ON THE SUPPLIED DRAWINGS AND AS STATED IN SPECIFICATIONS. REPLACE ALL SPRINKLER HEADS WITH QUICK RESPONSE LH/OH HAZARD SPRINKLER HEADS WITH EQUAL K–FACTORS. IMPLEMENT PROVISIONS OF NFPA 13 SECTION 19.2.3 FOR REDUCED DESIGN AREA. A 10 PERCENT PRESSURE SAFETY MARGIN SHALL BE CONSIDERED IN HYDRAULIC CALCULATIONS.

BUILDING DATA

OWNER: CITY OF REDLANDS, CA MUNICIPAL UTILITIES AND ENGINEERING DEPT
PROJECT NAME: JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION
STRUCTURE(BLDG): LABORATORY AND ENGINEERING BUILDING
LOCATION: REDLANDS, CALIFORNIA
HAZARD CATEGORY CLASSIFICATION:
OCCUPANCY AND USED GROUP: B (BUSINESS)
OCCUPANCY CLASSIFICATION:
– LIGHT HAZARD (LH)
– ORDINARY HAZARD GROUP I (OH1)
CONSTRUCTION TYPE: II B
BUILDING HEIGHT AND STORY: 23 FT, 1 STORY
BUILDING AREA: TOTAL: (E) 5,800 SF, (N) 1,990 SF
FIRE SPRINKLER SYSTEM: YES
FIRE ALARM SYSTEM: YES

ABBREVIATIONS

ABBRV	DESCRIPTION
AHJ	AUTHORITY HAVING JURISDICTION
AS	FULLY SPRINKLERED AREA/ROOM
AFF	ABOVE FINISHING FLOOR
BBOD	BELOW BOTTOM OF DECK
BFV	BUTTERFLY VALVE
BOR	BASE OF RISER
BR	BRASS
DCDA	DOUBLE CHECK DETECTOR ASSY
DI	DUCTILE IRON PIPE
(E)	EXISTING
FDC	FIRE DEPARTMENT CONNECTION
FH	FIRE HYDRANT
(N)	NEW
NS	NONSPRINKLERED AREA/ROOM
PIV	POST INDICATOR VALVE
POC	POINT OF CONNECTION
QR	QUICK RESPONSE
SSU	STANDARD SPRINKLER UPRIGHT
SSP	STANDARD SPRINKLER PENDENT
SR	STANDARD RESPONSE
UG	UNDERGROUND

HYDRANT FLOW TEST DATA

LOCATION: 1701 N NEVADA STREET
REDLANDS, CA
STATIC PRESSURE: 56psi
RESIDUAL PRESSURE: 39.5psi
SIZE OPENING: 4 in.
NUMBER OF NOZZLES: 1
COEFFICIENT: 1.35 (C)
PITOT READING: 15psi
FLOW: 1,456 gpm
DATE: 10/30/2024
TIME: 9:25 AM

HAZARD CLASSIFICATION LEGEND

LIGHT HAZARD

ORDINARY HAZARD GR1

SHEET INDEX

FP–1: GENERAL NOTES & LEGEND
FP–2: FIRE PROTECTION SYSTEM PLAN
FP–3: FIRE PROTECTION DETAILS

GENERAL NOTES

1. THE FIRE PROTECTION CONTRACTOR SHALL COORDINATE WITH MECHANICAL ENGINEER & ARCHITECT (CDM SMITH), DESIGN AND INSTALL FIRE SPRINKLER SYSTEM FOR ALL SPACES AND AREAS OF THE BUILDINGS AS INDICATED ON THE PLANS AND PER REFERENCE CODES AND STANDARDS.
2. IT IS THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR FOR VERIFICATION OF ALL DIMENSIONS, MEASUREMENTS, AND LOCATIONS OF EXISTING FACILITIES, UTILITIES, EQUIPMENT, AND OTHER EXISTING CONDITIONS WHICH MAY AFFECT CONSTRUCTION PRIOR TO SHOP DRAWINGS AND INSTALLATION. HOWEVER, IN THE EVENT OF DISCREPANCIES BETWEEN THE DRAWINGS AND ACTUAL FIELD CONDITIONS, CONTACT THE CONTRACTING OFFICER IMMEDIATELY.
3. THE FIRE PROTECTION CONTRACTOR SHALL SUBMIT SHOP DRAWINGS BASED ON THESE DRAWINGS FOR APPROVAL. SHOP DRAWINGS SHALL BE APPROVED BY AHJ PRIOR TO COMMENCING.
4. THE DESIGN AND INSTALLATION OF THE FIRE PROTECTION SYSTEMS SHALL BE IN STRICT ACCORDANCE WITH THE CALIFORNIA BUILDING CODE 2022 EDITION, NFPA 13, AND NFPA 24 AS WELL AS THE DESIGN SPECIFICATIONS.
5. LOCATION OF SPRINKLER HEADS SHALL BE ESTABLISHED BY THE FIRE PROTECTION CONTRACTOR USING THE CRITERIA AS NOTED IN THIS DRAWING.
6. CONTRACTOR SHALL PROVIDE A WATER FLOW TEST OF EXISTING WATER MAINS IN ACCORDANCE WITH AHJ, NFPA 291, & NFPA 13, AND SHALL PROVIDE HYDRAULIC CALCULATIONS BASED UPON THE WATER COMPANY SERVICE ADVISORY REPORT. SPRINKLER SYSTEMS' HYDRAULICS SHALL BE BASED UPON 90% OF THE PRESSURE DETERMINED BY THE FLOW TEST BY CONTRACTOR.
7. SEE CIVIL DRAWINGS FOR SITE PIPING.
8. CONTRACTOR SHALL OBTAIN AND PAY FOR ALL REQUIRED TEMPORARY AND PERMANENT PERMITS, INCLUDING LICENSES, CERTIFICATES, INSPECTIONS AND TESTS.
9. ALL DEVICES AND COMPONENTS TO BE UL LISTED AND APPROVED BY THE AUTHORITY HAVING JURISDICTION.
10. A HYDROSTATIC TEST SHALL BE PERFORMED FOR ALL SYSTEM PIPING AT NOT LESS THEN 200 PSI FOR TWO HOURS, OR 50 PSI ABOVE STATIC PRESSURE IN EXCESS OF 150 PSI FOR TWO HOURS, AND WITNESSED BY A LOCAL FIRE INSPECTOR.
11. ALL WELDING TO BE DONE BY CERTIFIED WELDERS.
12. SPRINKLER CONTRACTOR TO COORDINATE AND ADJUST SPRINKLERS TO ELECTRICAL, MECHANICAL, STRUCTURE AND ALL OTHER TRADES AT NO ADDITIONAL COST TO THE OWNER.
13. OWNER TO BE PROVIDED WITH TEST CERTIFICATES, CARE & MAINTENANCE BOOK (NFPA 25 LOCAL AMENDED, IF ANY) AND A SPARE HEAD CABINET WITH SPRINKLERS AND A WRENCH PER NFPA 13.
14. INSTALLATION OF SPRINKLER SYSTEM SHALL NOT BE STARTED UNTIL DRAWINGS, SPECIFICATIONS, CALCULATIONS, ETC. HAVE BEEN APPROVED BY LOCAL AHJ AND CDM SMITH.
15. SUPPLIED DRAWINGS ARE FOR REFERENCE ONLY. THE FIRE PROTECTION CONTRACTOR IS EXCLUSIVELY IN–CHARGE OF PRECISE ASSESSMENT OF EXISTING SITE CONDITIONS AND STRICT COMPLIANCE WITH REFERENCED CODES, STANDARDS, AND LOCAL AMENDMENTS FOR A COMPLETE UNMARK INSTALLATION.
16. THE END SPRINKLER ON EACH LINE SHALL BE RESTRAINED AGAINST EXCESSIVE VERTICAL AND LATERAL MOVEMENT. THE SPRINKLER PIPING MUST BE PROVIDED WITH SEISMIC PROTECTION DEVICES.
17. ALL SPRINKLER SYSTEM SHALL BE MONITORED BY THE ASSOCIATED FIRE ALARM SYSTEM.
18. THE SPRINKLER FLOW SWITCH SHALL BE TESTED (WITNESSED BY THE PROJECT INSPECTOR) TO CONFIRM THAT WHEN THE INSPECTOR'S TEST VALVE IS ACTIVATED AN ALARM WILL SOUND NO MORE THAN 90 SECONDS AFTER INITIAL FLOW.
19. CONNECTIONS TO SUPERVISING STATION FIRE ALARM SYSTEMS SHALL BE VERIFIED PROPER IDENTIFICATION AND TRANSMISSION OF ALARMS FROM AUTOMATIC FIRE EXTINGUISHING SYSTEMS (IBC 904.4.3).
20. SIGNAGE SHALL BE PROVIDED AS REQUIRED PER NFPA 13 AND CBC SEC. 912.5.
21. ALL VALVES CONTROLLING THE WATER SUPPLY (BACKFLOW AND RISER VALVE) FOR AUTOMATIC SPRINKLER SYSTEMS AND WATER FLOW SWITCHES ON ALL SPRINKLER SYSTEMS SHALL BE SUPERVISED (IBC SEC. 903.4).
22. A PERMANENT HYDRAULIC CALCULATIONS DESIGN DATA PLACARD SHALL BE ATTACHED TO THE RISER.
23. APPROVED IDENTIFICATION SIGNS SHALL BE PROVIDED TO OUTSIDE ALARM BELL "SPRINKLER FIRE ALARM – WHEN BELL RINGS CALL ***911 / FIRE DEPARTMENT***."

PROJECT NOTES

1. THE DRAWINGS ARE DIAGRAMMATIC IN NATURE AND ARE INTENDED FOR PURPOSES OF OBTAINING A BUILDING PERMIT AND AS THE BASIS OF DESIGN FOR PREPARATION OF DETAILED SHOP DRAWINGS. THE DRAWINGS ARE NOT INTENDED TO SHOW EXACT LOCATIONS, BUT TO DEMONSTRATE THE CONFIGURATION OF MAJOR SYSTEM COMPONENTS AND APPROXIMATE APPLIANCE AND DEVICE LOCATIONS. FIELD VERIFY LOCATIONS OF ALL DEVICES, AND SYSTEM COMPONENTS.
2. THE CONTRACTOR SHALL PROVIDE LAYOUT DRAWINGS, HYDRAULIC CALCULATIONS, CATALOG INFORMATION ON STANDARD PRODUCTS, AND OTHER CONSTRUCTION DATA PREPARED BY THE LICENSED CONTRACTOR THAT PROVIDES DETAIL ON THE LOCATION OF RISERS, CROSS MAINS, BRANCH LINES. SPRINKLER HEADS, SIZING OF PIPE, HANGER AND SEISMIC BRACING LOCATIONS, AND HYDRAULIC CALCULATIONS AND ALSO SERVES AS A GUIDE FOR FABRICATION AND INSTALLATION OF A FIRE PROTECTION SYSTEM. FIRE PROTECTION SYSTEM LAYOUT DOCUMENTS ARE BASED UPON ENGINEERING DIRECTION PROVIDED IN THE FIRE PROTECTION SYSTEM ENGINEERING DOCUMENTS AND REQUIRE NO ADDITIONAL ENGINEERING INPUT. THESE SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER OF RECORD FOR REVIEW. SHOP DRAWINGS STAMPED APPROVED OR FURNISH AS CORRECTED SHALL THEN BE SUBMITTED BY THE CONTRACTOR TO THE BUILDING DEPARTMENT AHJ FOR APPROVAL.
3. SPRINKLER HEADS SHALL BE AS FOLLOWS: HEADS MOUNTED IN CEILINGS SHALL BE CONCEALED OR RECESSED TYPE, QUICK RESPONSE FOR LIGHT AND ORDINARY HAZARD, AND STANDARD RESPONSE FOR EXTRA HAZARD OCCUPANCIES. SPRINKLER HEADS IN EXPOSED AREAS SHALL BE UPRIGHT, BRASS WITH CHROME FINISH IN NON–CORROSIVE AREAS AND WAX OR PTFE, OR WAX OVER PTFE COATED, OR STAINLESS STEEL IN CORROSIVE AREAS.
4. ALL SPRINKLER PIPING SHALL BE PAINTED FIRE RED WHERE INSTALLED EXPOSED AREAS. COLOR AS DIRECTED BY THE ARCHITECT IN PUBLIC SPACES.
5. COORDINATION WITH MECHANICAL AND PLUMBING CONTRACTORS IS REQUIRED PRIOR TO SUBMISSION OF SPRINKLER SHOP DRAWINGS, ADDITIONAL ROWS OF SPRINKLER HEADS MAY BE REQUIRED IN SOME SPACES WHERE LARGE DUCTWORK PREVENTS MAXIMUM HEAD SPACING FROM WALLS. WHERE NEEDED FOR COORDINATION, THE SPRINKLER PIPING SHALL OFFSET AROUND DUCT RUNS.
6. THE WATER SUPPLY TO THE FIRE PROTECTION SYSTEM SHALL BE TESTED FOR CONTAMINANTS THAT MAY LEAD TO MICROBIAL CORROSION. IF POSSIBLE CONTAMINANTS ARE FOUND, PROTECTIVE MEASURES SHALL BE DESIGNED INTO THE SYSTEM. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROCUREMENT OF THE TEST, AND EVALUATION OF THE RESULTS. PROVIDE TEST RESULTS AND RECOMMENDATIONS TO THE DESIGN TEAM AND OWNER.
7. AT THE CONTRACTOR OPTION, FLEXIBLE HEADS MAY BE USED. HOWEVER, NO EXCESS FLEXIBLE PIPE MAY BE RESTING ON CEILING TILES. RESTRICT USE TO 3'–0" SECTIONS.

DELEGATED DESIGN STATEMENT:

THE FIRE PROTECTION DRAWINGS REPRESENT A PERFORMANCE SPECIFICATION FOR THE FINAL FIRE SPRINKLER SYSTEM. THE FIRE PROTECTION CONTRACTOR SHALL SUBMIT A COMPLETE INSTALLATION DRAWING PACKAGE INCLUDING ALL CALCULATIONS AND PRODUCT DATA FOR REVIEW AND APPROVAL AS A DEFERRED SUBMITTAL TO ALL REQUIRED REVIEWING AUTHORITIES. INSTALLATION DRAWING PACKAGE SHALL INCLUDE SEALED SHOP DRAWINGS AND HYDRAULIC CALCULATIONS INDICATING THE SPRINKLER SYSTEM LAYOUT, INCLUDING FINAL HEAD LOCATIONS AND CURRENT WATER FLOW TEST. ALL DOCUMENTS ARE TO BE REVIEWED AND SIGNED AND SEALED BY A LICENSED ENGINEER CERTIFIED IN THE STATE OF CALIFORNIA.

NOTES

- THESE PLANS ARE FOR REFERENCE ONLY AND SHOWING THE PERFORMANCE REQUIREMENTS OF THE SYSTEM.
- A SEPARATE SUBMITTAL / PERMIT IS REQUIRED FOR THE FIRE SPRINKLER SYSTEMS.

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R=13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	PV	JG

Revisions

CDM Smith
600 Wilshire Blvd #750
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER
PATRICK VELDENIAN
No. FP1968
Exp. 03.31.26
FIRE PROTECTION
STATE OF CALIFORNIA

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT PROJECT No. 521028

GENERAL NOTES AND LEGEND

Designed by: P.VELDENIAN
Date: MAY 2025
Checked by: J.J.GASS
Date: MAY 2025
Drawn by: P.VELDENIAN
Date: MAY 2025
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REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 103 of 126 Sheets
Scale Horiz. NTS
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FP-1

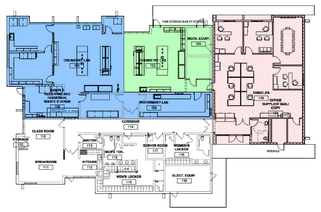
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FIRE SUPPRESSION SYSTEM SCHEDULE

CLASSIFICATION OF HAZARD PATTERN	SYSTEM TYPE	OCCUPANCY HAZARD CLASSIFICATION	SPRINKLER DESIGN DENSITY	MINIMUM DESIGN AREA	COMBINED HOSE STREAM
	WET PIPE	LIGHT HAZARD	0.10 GPM/SQ.FT. DENSITY OVER 1500 SQ.FT.	1500 SQ.FT.	100 GPM
	WET PIPE	ORDINARY HAZARD CLASS I	0.15 GPM/SQ.FT.	1500 SQ.FT.	250 GPM

PATTERN	DESCRIPTION
	EXISTING AREA WITH WET SPRINKLER SYSTEM NOT IN SOW



CONSTRUCTION SEQUENCE PLAN

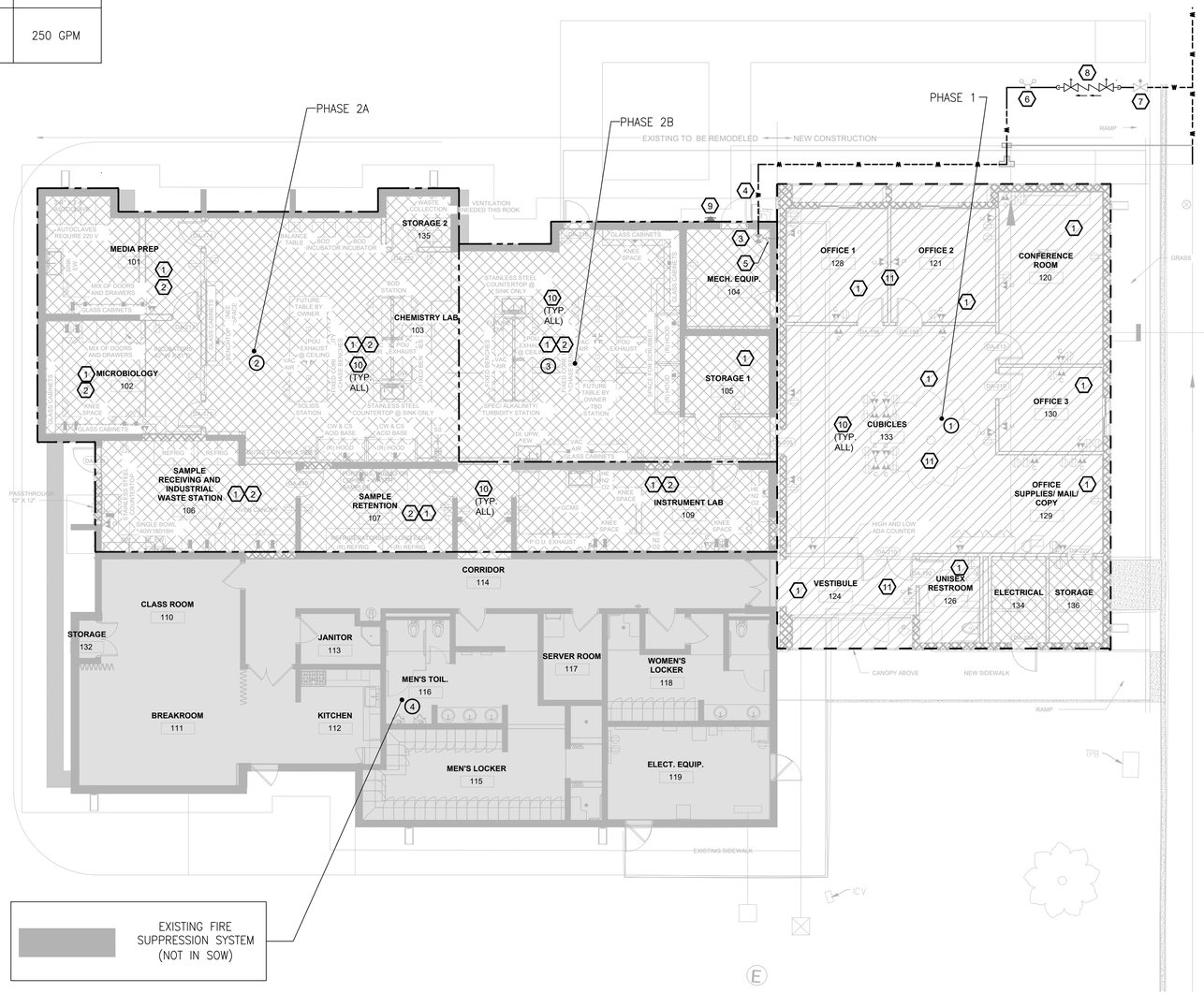
CONSTRUCTION SEQUENCE

PHASE 1
BUILD THE OFFICE EXPANSION AND MOVE ADMINISTRATIVE STAFF INTO THE OFFICE WING. THIS INCLUDES FLEX SPACE FOR LABORATORY TECHNICIANS.

PHASE 2A
CONTRACT FOR CONSTRUCTION FOR THE MICROBIOLOGY AND MEDIA PREP LABORATORIES. DURING THIS PHASE OF CONSTRUCTION, THE CONTRACTOR WILL HAVE FULL ACCESS TO THE WEST SIDE OF THE LABORATORY, INCLUDING ENTRY FROM THE EXISTING LOBBY, TO RENOVATE WHILE THE EXISTING EAST LABORATORY AREA MAINTAINS OPERATIONS WITH ACCESS FROM THE SOUTH CORRIDOR AND NEW OFFICE EXPANSION.

PHASE 2B
MOVE ALL LABORATORY OPERATIONS INTO THE NEWLY RENOVATED WEST LABORATORY AREA AND RENOVATE THE EAST LABORATORY AREA.

EXISTING - NOT IN SCOPE



EXISTING FIRE SUPPRESSION SYSTEM (NOT IN SOW)

FIRE SUPPRESSION PLAN

SCALE: 1'= 1/8"

1/8" = 1'– 0"
4 2 0 4 8

N

GENERAL NOTES

1. THE FIRE PROTECTION CONTRACTOR SHALL COORDINATE THE LOCATION AND ELEVATION OF ALL SPRINKLERS WITH ALL TRADES. NO FIRE PROTECTION PIPING SHALL BE INSTALLED WITHOUT COORDINATED SHOP DRAWINGS. CONFLICTS DUE TO INSTALLATION SHALL BE IDENTIFIED AND CORRECTIONS MADE DURING THE SHOP DRAWING PROCESS.
2. PIPE PENETRATION THROUGH RATED WALL SHOULD HAVE FIRE BARRIER CAULK AROUND PIPE.

PLAN NOTES

1. RECESSED SPRINKLERS IN DROP CEILING
2. ADD NEW, AND RELOCATE OR REMOVE (E) SPRINKLERS PER NFPA 13 TO ACCOMMODATE FOR NEW SPACING & WALLS
3. (E) 4" SPRINKLER RISER WITH TAMPER AND FLOW SWITCH
4. 6" FIRE SERVICE U/G PIPE ENTRY
5. RELOCATE (E) MAIN DRAIN VALVE AND PIPING TO THE NORTH WALL. EXACT LOCATION TO BE FIELD VERIFIED
6. (E) RELOCATED FREESTANDING 2-WAY FIRE DEPARTMENT CONNECTION WITH CHECK VALVE
7. (E) RELOCATED POST INDICATING VALVE WITH ELECTRIC MONITORING SWITCH
8. REMOVED (E) BACKFLOW AND REPLACED WITH A NEW 6" WATTS SERIES 774DCDA DOUBLE CHECK DETECTOR ASSEMBLY
9. (E) FIRE ALARM BELL TO REMAIN
10. REPLACE ALL (E) SPRINKLER HEADS IN ALL ROOMS AND AREAS WITH NEW QUICK RESPONSE K-5.6 FACTOR (TYP ALL).
11. (N) SPRINKLER QUICK RESPONSE K-5.6 FACTOR THROUGHOUT NEW AREAS (TYP. ALL NEW AREAS).

CONSTRUCTION SEQUENCES

1. PHASE I: PROVIDE A COMPLETE NEW SPRINKLER SYSTEM IN THE AREA INDICATED AS PHASE I PER LIGHT HAZARD OCCUPANCY CLASSIFICATION IN OFFICE AND SIMILAR ROOMS. PROVIDE ORDINARY HAZARD I SYSTEM DESIGN IN ELECTRICAL AND STORAGE ROOMS.
2. PHASE 2A: REMODEL THE EXISTING SPRINKLER SYSTEM IN THE INDICATED "PHASE 2A" PER NEW ROOM DIMENSIONS, AREAS SPACING, AND WALL ALTERATIONS. ADD, REMOVE, AND RELOCATE SPRINKLER HEADS AND DROPS TO ACCOMMODATE NEW SPRINKLER SYSTEM DESIGN PER HAZARD CLASSIFICATION AND NFPA 13. PROVIDE ORDINARY HAZARD CLASS I SYSTEM DESIGN REQUIREMENTS.
3. PHASE 2B: REMODEL THE EXISTING SPRINKLER SYSTEM IN THE INDICATED "PHASE 2B" AREA (THE REST OF THE LAB BUILDING) PER NEW ROOM DIMENSIONS, AREAS SPACING, AND WALL ALTERATIONS. ADD, REMOVE, AND RELOCATE SPRINKLER HEADS AND DROPS TO ACCOMMODATE NEW SPRINKLER SYSTEM DESIGN PER HAZARD CLASSIFICATION AND NFPA 13. PROVIDE ORDINARY HAZARD CLASS I SYSTEM DESIGN REQUIREMENTS.
4. EXISTING AREA: NOT IN THE SOW.

NOTES

- THESE PLANS ARE FOR REFERENCE ONLY AND SHOWING THE PERFORMANCE REQUIREMENTS OF THE SYSTEM.
- A SEPARATE SUBMITTAL / PERMIT IS REQUIRED FOR THE FIRE SPRINKLER SYSTEMS.

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R=13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	08/15	PV	JG

Revisions

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REGISTERED PROFESSIONAL ENGINEER
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No. FP1968
Exp. 03.31.26
FIRE PROTECTION
STATE OF CALIFORNIA

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT
PROJECT No. 521028

FIRE PROTECTION PLAN

Designed by: P.VELDENIAN
Date: MAY 2025
Checked by: J.J.GASS
Date: MAY 2025
Drawn by: P.VELDENIAN
Date: MAY 2025
Checked by: J.J.GASS
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 104 of 126 Sheets
Scale Horiz. 1'=1/8"
Vert. 1'=1/8"

FP-2

WW-00007

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SYSTEM PLACARD SHALL BE MADE OF 16 GA. GALVANIZE SHEET METAL WITH ENGRAVED LETTERING. DATA SHALL BE EMBOSSED.

HYDRAULIC-SYSTEM

THIS BUILDING IS PROTECTED BY A HYDRAULICALLY DESIGNED AUTOMATIC SPRINKLER SYSTEM

LOCATION

NO. OF SPRINKLERS

BASIS OF DESIGN

1. DENSITY

2. DESIGNED AREA OF DISCHARGE

SYSTEM DEMAND

1. GPM DISCHARGE

2. RESIDUAL PRESSURE AT THE BASE OF THE RISER

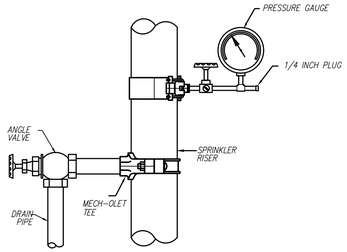
SPRINKLER SYSTEM HYDRAULIC PLACARD

NOT TO SCALE

SPRINKLER
FIRE - ALARM
WHEN BELL RINGS
CALL
FIRE DEP'T. OR POLICE

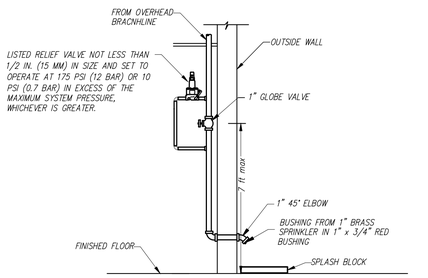
IDENTIFICATION SIGN - OUTSIDE ALARM DEVICE

SECTION A.6.17.1 NFPA 13 NOT TO SCALE



(E) MAIN DRAIN CONNECTION TO BE REROUTED TO THE NORTH WALL

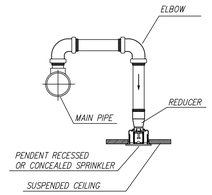
NOT TO SCALE



(N) 1/2" RELIEF VALVE SET TO 175 PSI

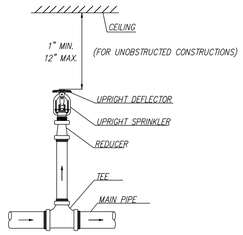
Section 6.12 **ADD TO (E) INSPECTORS TEST AND DRAIN**

NOT TO SCALE



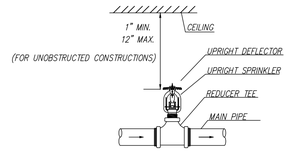
PENDENT SPRINKLER HEAD DETAIL

NOT TO SCALE



SPRIG UP SPRINKLER HEAD DETAIL

NOT TO SCALE



UPRIGHT SPRINKLER EXPOSED AREAS

NOT TO SCALE



PIPE HANGER 1

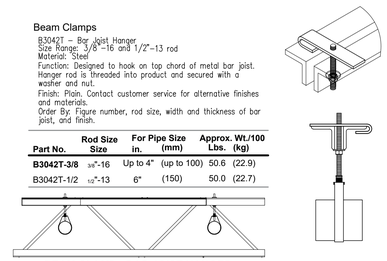
NOT TO SCALE

1 -- All Thread Rod
1 -- Ring
1 -- Top Beam Clamp

Beam Clamps

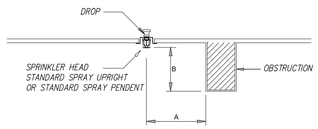
B3042T – Bar Joist Hanger
Size Range: 3/8"-16 and 1/2"-13 rod
Material: Steel
Function: Designed to hook on top chord of metal bar joist. Hanger rod is threaded into product and secured with a washer and nut.
Finish: Plain. Contact customer service for alternative finishes and materials.
Order By: Figure number, rod size, width and thickness of bar joist, and finish.

Part No.	Rod Size	For Pipe Size in. (mm)	Approx. Wt./100 Lbs. (kg)
B3042T-3/8	3/8"-16	Up to 4" (up to 100)	50.6 (22.9)
B3042T-1/2	1/2"-13	6" (150)	50.0 (22.7)



BEAM CLAMP - BAR JOIST HANGER

NOT TO SCALE



DISTANCE FROM SPRINKLERS TO SIDE OF OBSTRUCTION (A)	MAX. ALLOWANCE DISTANCE OF DEFLECTOR ABOVE BOTTOM OF OBSTRUCTION (IN.) (B)
LESS THAN 1 FT.	0
1'-0" TO LESS THAN 1'-6"	2-1/2
1'-6" TO LESS THAN 2'-0"	3-1/2
2'-0" TO LESS THAN 2'-6"	5-1/2
2'-6" TO LESS THAN 3'-0"	7-1/2
3'-0" TO LESS THAN 3'-6"	9-1/2
3'-6" TO LESS THAN 4'-0"	12
4'-0" TO LESS THAN 4'-6"	14
4'-6" TO LESS THAN 5'-0"	16-1/2
5'-0" TO LESS THAN 5'-6"	18
5'-6" TO LESS THAN 6'-0"	20
6'-0" TO LESS THAN 6'-6"	24
6'-6" TO LESS THAN 7'-0"	30
7'-0" TO LESS THAN 7'-6"	35

SPRINKLER OBSTRUCTION TABLE

NOT TO SCALE

GENERAL SPRINKLER CABINET NOTES:

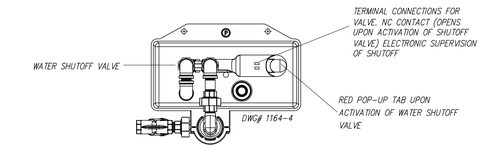
1. A WALL MOUNTED CABINET FOR SPARE SPRINKLER HEADS AND SPRINKLER WRENCH SHALL BE PROVIDED.
2. A SPRINKLER WRENCH COMPATIBLE FOR EACH TYPE OF SPRINKLER HEAD USED SHALL BE PROVIDED IN THE SPRINKLER CABINET.
3. SPARE SPRINKLER HEADS OF EACH TYPE USED SHALL BE PROVIDED IN THE CABINET.
4. SPARE SPRINKLER SHALL BE OF THE SAME TYPE AND MANUFACTURE AS SPECIFIED ON DRAWINGS.
5. INSTALL CABINET IN ROOM 108.
6. MOUNT CABINET 48" A.F.F.
7. SEE SPRINKLE SCHEDULES AND LEGENDS FOR FIRE SPRINKLER MANUFACTURE.



SPRINKLERS IN CABINET	
NUMBER OF SPRINKLERS IN SYSTEM	MIN. NUMBER OF SPARE SPRINKLERS REQUIRED
LESS THAN 300	6
300-1000	12
GREATER THAN 1000	24

FIRE SPRINKLER CABINET NOTES AND DETAILS

NOT TO SCALE



(N) AUTOMATIC AIR VENT VALVE

Section 7.1.5 NOT TO SCALE

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

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Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER
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FIRE PROTECTION
STATE OF CALIFORNIA

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT PROJECT No. 521028

FIRE PROTECTION DETAILS

Designed by: P.VELDENIAN
Date: MAY 2025
Checked by: J.J.GASS
Date: MAY 2025
Drawn by: P.VELDENIAN
Date: MAY 2025
Checked by: J.J.GASS
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 105 of 126 Sheets
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Vert. NTS

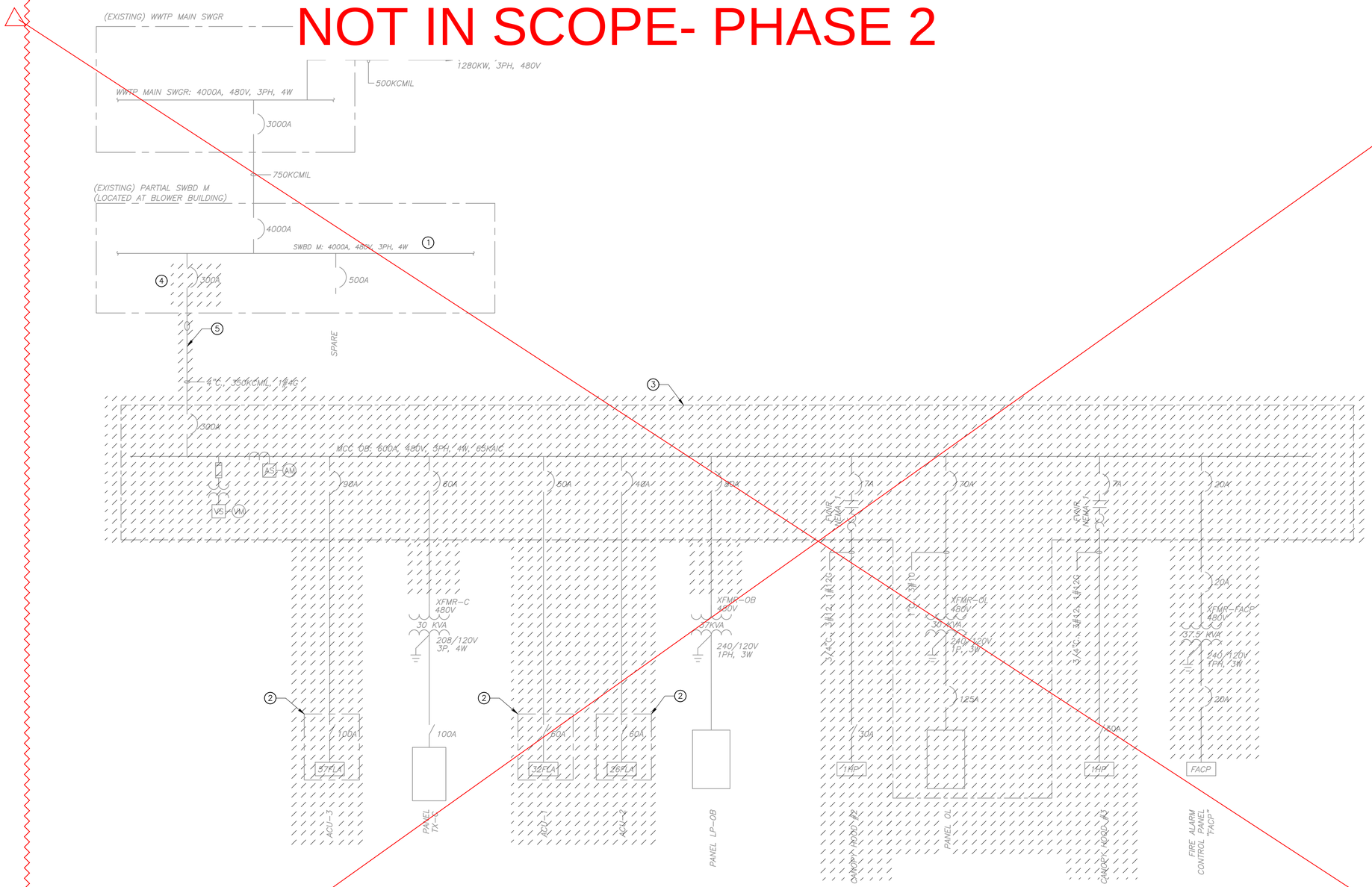
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NOT IN SCOPE- PHASE 2



EXISTING MCC OB

ONE-LINE DIAGRAM

NTS

DEMOLITION GENERAL NOTES:

1. CONTRACTOR SHALL DISCONNECT ALL ELECTRICAL POWER CONNECTIONS FOR ALL EQUIPMENT TO BE REMOVED IN ORDER TO ALLOW SAFE AND COMPLETE REMOVAL OF ALL ASSOCIATED EQUIPMENT IN THIS AREA.
2. ITEMS SHOWN HATCHED ARE IDENTIFIED FOR DEMOLITION UNLESS OTHERWISE STATED IN THE DRAWING.
3. SURVEY THE EXISTING ELECTRICAL SYSTEMS AND EQUIPMENT IDENTIFIED FOR REMOVAL WITH OWNER AND REPRESENTATIVES FROM OTHER TRADES PRIOR TO PERFORMING ANY DEMOLITION WORK.
4. REMOVE EXPOSED CONDUITS, OUTLET BOXES, PULLBOXES AND HANGERS MADE OBSOLETE BY THE ALTERATIONS, UNLESS DESIGNATED TO REMAIN. PATCH SURFACES AND PROVIDE BLANK COVERS FOR ABANDONED OUTLETS.
5. ABANDONED CONDUITS CONCEALED IN FLOOR OR CEILING SLABS OR IN WALLS, SHALL BE CUT FLUSH WITH THE SLAB OR WALL AT THE POINT OF ENTRANCE. THE CONDUITS SHALL BE SUITABLY PLUGGED AND THE AREA REPAIRED IN A FLUSH, SMOOTH AND APPROVED MANNER.
6. CONTRACTOR SHALL COORDINATE SEQUENCE OF DEMOLITION WITH THE OWNER PRIOR TO ANY AND ALL ELECTRICAL WORK ASSOCIATED WITH EXISTING EQUIPMENT AND SYSTEMS.

KEY NOTES:

1. CONTRACTOR TO VERIFY THE EXISTING SWITCHBOARD RATING BEFORE REPLACING THE CIRCUIT BREAKER.
2. REFER TO MD-2 AND MD-4 FOR LOCATION OF ACU-1, ACU-2 AND ACU-3.
3. MCC OB WILL BE DEMOLISHED ON PHASE 2.
4. CIRCUIT BREAKER WILL BE DEMOLISHED ON PHASE 2.
5. DUCTBANK AND FEEDER TO MCC OB WILL BE DEMOLISHED ON PHASE 2.

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6-4-25

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

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Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	8/15	SM	SM

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT
PROJECT No. 521028

ELECTRICAL DEMOLITION- MCC OB ONELINE DIAGRAM

Designed by: A. DINESH
Date: MAY 2025
Checked by: M. SHERLY
Date: MAY 2025
Drawn by: V. VIDHU PRIYA
Date: MAY 2025
Checked by: M. SEJAL
Date: MAY 2025

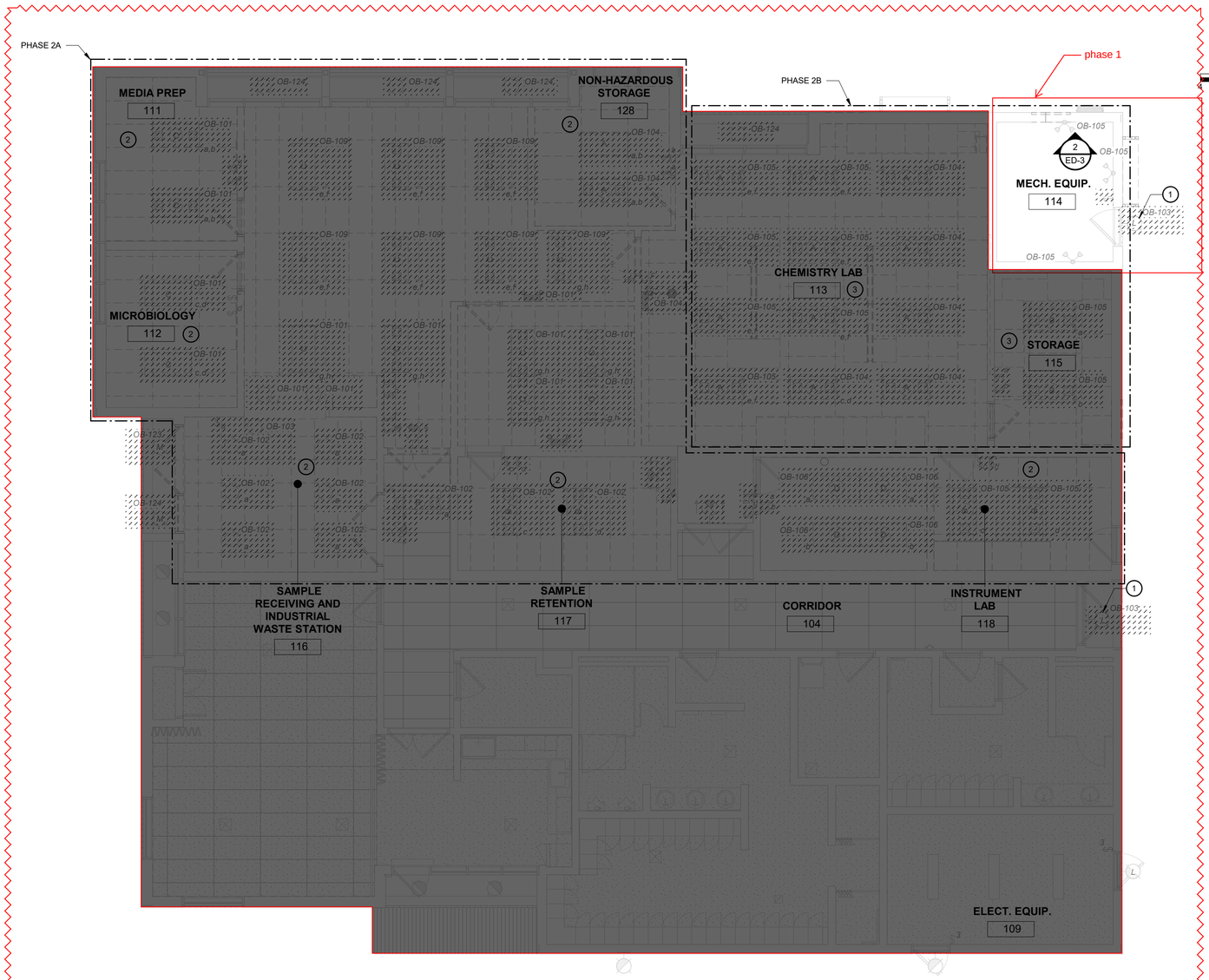
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, R.C.E. 75646 DATE

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Vert. X

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PLAN
3/16" = 1'-0"

GENERAL NOTES:

1. DRAWING IS FOR REFERENCE ONLY. CONTRACTOR TO FIELD VERIFY EXISTING LOCATION OF EQUIPMENT AND DEMOLISH IT IN ITS ENTIRITY.
2. PRIOR TO DEMOLISHING ELECTRICAL EQUIPMENT, TRACE EXISTING WIRING TO ITS POWER SOURCE AND LOCK OUT-TAG OUT THE EQUIPMENT, DISCONNECTING MEANS WITH THE SUPPLY.
3. REMOVE EXPOSED CONDUITS, OUTLET BOXES, PULLBOXES, AND HANGERS MADE OBSOLETE BY THE DEMOLITION, UNLESS DESIGNATED TO REMAIN. PATCH SURFACES AND PROVIDE BLANK COVERS FOR ABANDONED OUTLETS.
4. ABANDONED CONDUITS CONCEALED IN FLOOR OR CEILING SLABS OR IN WALLS SHALL BE CUT FLUSH WITH THE SLAB OR WALL AT THE POINT OF ENTRANCE. FILL AND PATCH SURFACES TO MATCH ADJACENT SURFACE FINSIH MATERIALS AND FINISHES.
5. REFER TO MECHANICAL, ARCHITECTURAL, AND LABORATORY DEMOLITION SHEETS FOR ADDITIONAL EQUIPMENT SCHEDULED TO BE DEMOLISHED.

KEY NOTES:

1. LIGHT WILL BE DEMOLISHED ON PHASE 1.
2. ~~LIGHTS IN ROOMS 111, 112, 116, 117, 118, 105 AND PARTIAL OF ROOM 113 WILL BE DEMOLISHED ON PHASE 2A.~~
3. ~~LIGHTS IN PARTIAL OF ROOM 113 AND ROOM 115 WILL BE DEMOLISHED ON PHASE 2B.~~

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ELECTRICAL
STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	8/15	SM	SM

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

ELECTRICAL DEMOLITION LIGHTING PLAN

Design by: A. DINESH
Date: MAY 2025
Checked by: M. SHERLY
Date: MAY 2025
Drawn by: V. VIDHU PRIYA
Date: MAY 2025
Checked by: M. SEJAL
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

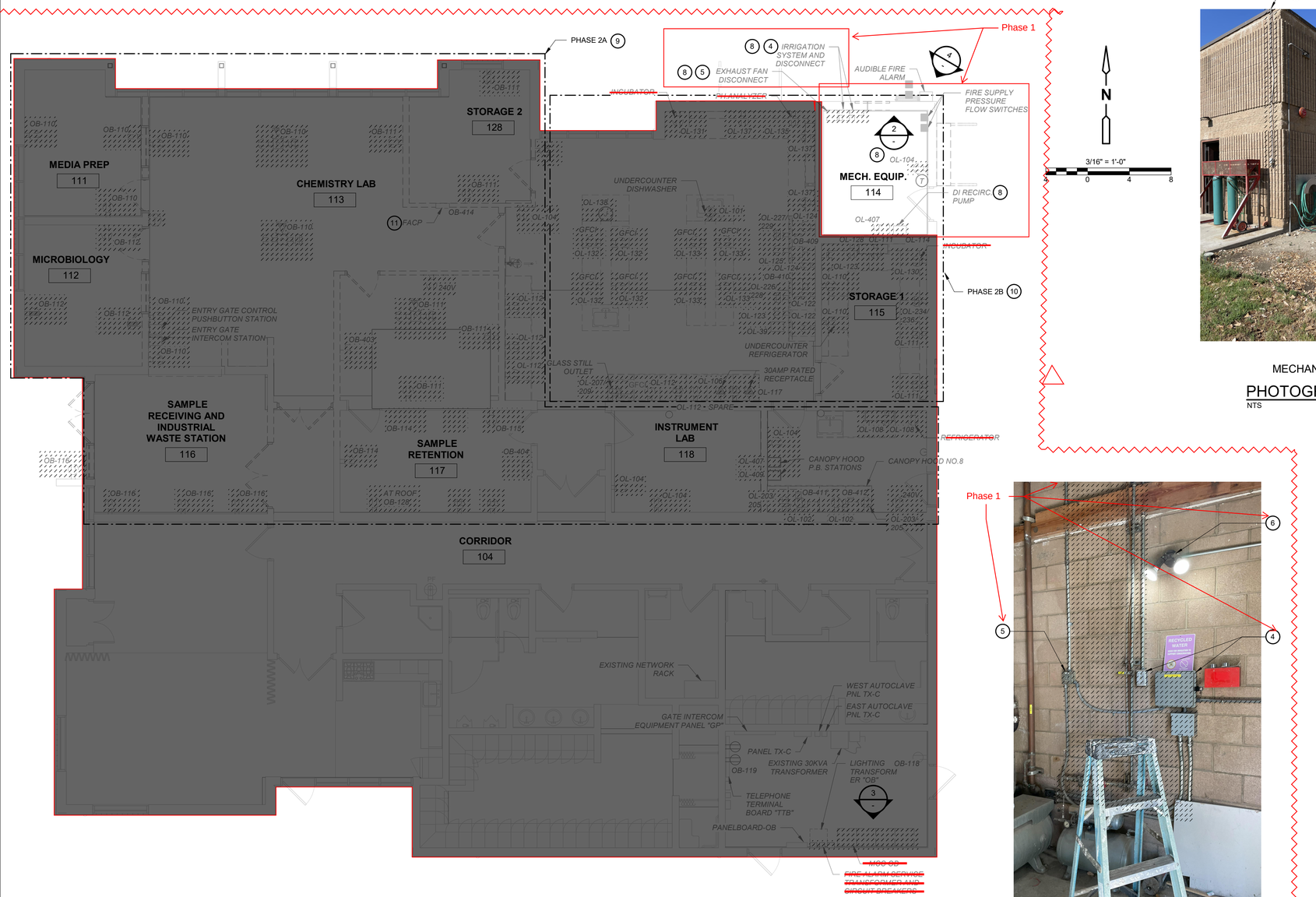
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

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PLAN
3/16" = 1'-0"

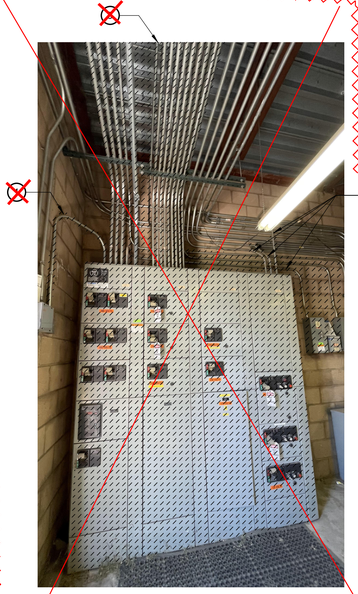


MECHANICAL ROOM 1

PHOTOGRAPH 4 ED-3
NTS

MECHANICAL ROOM

PHOTOGRAPH 2 ED-3
NTS



MCC OB_LOCATED IN EXISTING ELECTRICAL ROOM

PHOTOGRAPH 3 ED-3
NTS

GENERAL NOTES:

1. DRAWING IS FOR REFERENCE ONLY. CONTRACTOR TO FIELD VERIFY EXISTING LOCATION OF EQUIPMENT AND DEMOLISH IT IN ITS ENTIRITY.
2. PRIOR TO DEMOLISHING ELECTRICAL EQUIPMENT, TRACE EXISTING WIRING TO ITS POWER SOURCE AND LOCK OUT- TAG OUT THE EQUIPMENT, DISCONNECTING MEANS WITH THE SUPPLY.
3. REMOVE EXPOSED CONDUITS, OUTLET BOXES, PULLBOXES, AND HANGERS MADE OBSOLETE BY THE DEMOLITION, UNLESS DESIGNATED TO REMAIN. PATCH SURFACES AND PROVIDE BLANK COVERS FOR ABANDONED OUTLETS.
4. ABANDONED CONDUITS CONCEALED IN FLOOR OR CEILING SLABS OR IN WALLS SHALL BE CUT FLUSH WITH THE SLAB OR WALL AT THE POINT OF ENTRANCE. FILL AND PATCH SURFACES TO MATCH ADJACENT SURFACE FINSIH MATERIALS AND FINISHES.
5. REFER TO MECHANICAL, ARCHITECTURAL, AND LABORATORY DEMOLITION SHEETS FOR ADDITIONAL EQUIPMENT SCHEDULED TO BE DEMOLISHED.

KEY NOTES:

1. ~~REPLACE THE CONDUIT AND CIRCUIT, THEN RE-ROUTE TO THE NEW GWDB OB.~~ Not in scope
2. ~~CUT AND RE-ROUTE THE CONDUIT AND CIRCUIT TO THE NEW GWDB OB. THE CONDUCTORS SHALL BE REPLACED.~~ Not in scope
3. ~~DEMOLISH THE EXISTING CONDUIT AND CIRCUITS, AND RE-ROUTE THE NEW CIRCUITS TO THE NEW GWDB OB~~ Not in scope
4. IRRIGATION SYSTEM AND DISCONNECT SWITCH SHALL BE RELOCATED TO EAST WALL OF MECHANICAL ROOM AND ALL ASSOCIATED CONDUITS AND CIRCUITS SHALL BE RE-ROUTED. REFER TO SHEET E-7 FOR DETAILS ON NEW LOCATION.
5. FAN DISCONNECT SWITCH SHALL BE RELOCATED TO EAST WALL OF MECHANICAL ROOM AND ALL ASSOCIATED CONDUITS AND CIRCUITS SHALL BE RE-ROUTED.
6. LIGHT FIXTURE SHALL BE RELOCATED ABOVE NEW DOOR OF MECHANICAL ROOM AND ALL ASSOCIATED CONDUITS AND CIRCUITS SHALL BE RE-ROUTED.
7. ~~CONTRACTOR SHALL FIELD VERIFY, IF THERE IS ANY CIRCUIT ROUTED THROUGH THIS CONDUIT, AND RE-ROUTE AS NEEDED. OTHERWISE DEMOLISH THE CONDUIT.~~ Not in scope
8. ELECTRICAL OUTLETS, DATA AND DISCONNECT SWITCHES WILL BE DEMOLISHED ON PHASE 1.
9. ~~ELECTRICAL OUTLETS, DATA AND DISCONNECT SWITCHES WILL BE DEMOLISHED ON PHASE 2A.~~ Not in scope
10. ~~ELECTRICAL OUTLETS, DATA AND DISCONNECT SWITCHES WILL BE DEMOLISHED ON PHASE 2B.~~ Not in scope
11. ~~FACP WILL BE RELOCATED TO NEW LOCATION. REFER TO SHEET E-7 FOR NEW LOCATION.~~ Not in scope

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6-4-25

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

ELECTRICAL DEMOLITION POWER PLAN

BENCHMARK
CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM
ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	8/15	SM	SM

Revisions

Design by: A. DINESH
Date: MAY 2025
Checked by: M. SHERLY
Date: MAY 2025
Drawn by: V. VIDHU PRIYA
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Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

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NOT IN SCOPE- PHASE 2

125 AMP MAIN BREAKER — **PANELBOARD OL** — **ACTIVITY WCC OB**
225 AMP BUS RATING — **42** POLES — **10** KA SHORT CIRCUIT RATING — ENCLOSURE RATING: NEMA 1
120/240 VOLTS — **1** PHASE **3** WIRE — **60** Hz. — INTERNAL SPD : NO — MOUNTING: SURFACE

CIRCUIT NO.	DESCRIPTION	LOAD KVA LINE 1	LOAD KVA LINE 2	BREAKER AMPS/ POLES	NOTES
1	LIGHTS/PLANT AUDIO SPACE			20 /1	
3	EXIT LIGHTS			20 /1	
5	LIGHTS - LABORATORY			20 /1	
7	LIGHTS - CONF. ROOM LUNCH/KITCHEN			20 /1	
9	LIGHTS - OFFICE			20 /1	
11	RECEPT. - LABORATORY			20 /1	
13	RECEPT. - LABORATORY			20 /1	
15	PLUGS / OFFICE			20 /1	
17	PLUGS/OUTSIDE (EAST) LADIES + MENS BATHR			20 /1	
19	PLUG/PHONE BACKBOARD			20 /1	
21	KITCHEN/PLUG + DISPOSER			20 /1	
23	PARKING LOT/EXTERIOR LIGHTS			20 /1	
25	TO OM - 408 AT MCC "OMF FOR EF-1 & EF-2			20 /1	
27	TO OM - 408 AT MCC "OM" FOR EF-3			20 /1	
29	MICROWAVE			20 /1	
31	BAC-TEE ROOM			30 /1	
33	OUTLETS FOR DATA CABLE DRIVES			20 /1	
35	KITCHEN STOVE		4.8	50 /2	
37		4.8			
39	DISHWASHER IN FURNACE ROOM		3.1	40 /2	
41		3.1			
	TOTAL LINE KVA THIS SIDE	7.9	7.9		

NOTES:
1. PROVIDE LOCKING HARDWARE
3. 30 ma GFI CIRCUIT BREAKER FOR EQUIPMENT PROTECTION ONLY (HEAT TRACE)
5. BRANCH CIRCUIT WIRING: 3/4"C., 2#12, 1#12G
7.

CIRCUIT NO.	DESCRIPTION	LOAD KVA LINE 1	LOAD KVA LINE 2	BREAKER AMPS/ POLES	NOTES
2	EXTERIORS			20 /1	
4	PLUGS/OFFICE			20 /1	
6	PLUGS/LABORATORY			20 /1	
8	LIGHTS - BATHROOM + ELECT. ROOM			20 /1	
10	PLUGS/OFFICE/CONF. ROOM/KITCHEN			20 /1	
12	PLUGS/OFFICE/CONF. ROOM			20 /1	
14	PLUGS/OFFICE/LABORATORY (EAST WALL)			20 /1	
16	PLUGS/HALLWAY/EAST BRK ROOM/LOBBY			20 /1	
18	PLUGS/BREAKROOM			20 /1	
20	PLUGS/KITCHEN + REFRIGERATOR			20 /1	1
22	COFFEE GRINDER			20 /1	
24	EXTERIOR LIGHTS + PARKING LOT			20 /1	
26	TO OM-407 AT MCC "OMF FOR EF-4			20 /1	
28	LIGHTS/LOBBY/CONF. ROOM/LADIES		0.18	20 /1	
30	SPARE			/2	
32					
34	OUTLETS	1.72		20 /1	
36	ICE MAKER		0.1	30 /1	
38	HONEYWELL EMS PANEL	0.5		20 /1	
40	HVAC			60 /2	
42					
	TOTAL LINE KVA THIS SIDE	1.72	0.28		
	TOTAL KVA PER LINE	9.62	8.18		
	TOTAL KVA	17.8			

NOTES CONT.
2. 5 ma GROUND FAULT INTERRUPTER (GFI) CIRCUIT BREAKER
4. PROVIDE LOCKING HARDWARE & PAINT BREAKER HANDLE RED (FACP)
6.
8.

EXISTING PANELBOARD LP-OB

175 AMP MAIN BREAKER — LOCATION: **ELECTRICAL RM**
225 AMP BUS RATING — **42** POLES — **10** KA SHORT CIRCUIT RATING — ENCLOSURE RATING: **NEMA 1**
120/240 VOLTS — **1** PHASE **3** WIRE — **60 Hz.** — INTERNAL SPD : **NO** — MOUNTING: **SURFACE**

GENERAL NOTES:

1. PROVIDE A NEW TYPEWRITTEN PANELBOARD SCHEDULE FOR EXISTING PANELBOARDS BEING MODIFIED TO BE INSERTED INTO THE PLASTIC SLEEVE BEHIND THE PANELBOARD DOOR. COORDINATE NAMES WITH THE OWNER PRIOR TO PRINTING.
2. CONTRACTORS SHALL FIELD VERIFY EXISTING PANELBOARD CAPACITIES PRIOR TO ADDITION OF ANY NEW LOADS TO THE PANELBOARDS IN ACCORDANCE WITH NEC ARTICLE 220.87. PROVIDE PEAK DEMAND MEASURMENT TO THE ENGINEER FOR REVIEW PRIOR TO MODIFYING THE EX. PANELBOARDS.

KEY NOTES:

(1) REMOVE EXHAUST FAN CONNECTION ONLY.

CDM Smith
600 Wilshire Blvd #750
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER — SEAL KIRIT MEHTA — No. E 21688 — ELECTRICAL — STATE OF CALIFORNIA
6-4-25

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	8/15	SM	SM

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT
PROJECT No. 521028
ELECTRICAL
DEMOLITION PANELBOARD SCHEDULES

Designed by: A. DINESH — Date: MAY 2025
Checked by: M. SHERLY — Date: MAY 2025
Drawn by: V. VIDHU PRIYA — Date: MAY 2025
Checked by: M. SEJAL — Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, R.C.E. 75646 DATE

Sheet 109 of 126 Sheets
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Vert. X

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ONE LINE OR CONTROL DIAGRAM	PLAN	DESCRIPTION
52 CS	——	MEDIUM VOLTAGE DRAWOUT TYPE POWER CIRCUIT BREAKER CS=CONTROL SWITCH
FRAME TRIP	CB	LOW VOLTAGE AIR OR MOLDED CASE CIRCUIT BREAKER, 3 POLE UNLESS OTHERWISE NOTED.
SIZE # AMPS TYPE *		COMBINATION MOTOR CIRCUIT PROTECTOR AND MAGNETIC MOTOR STARTER, FULL VOLTAGE NON–REVERSING UNLESS OTHERWISE NOTED: ✱ FVR – FULL VOLTAGE REVERSING RVNR – REDUCED VOLTAGE NON–REVERSING RVAT – REDUCED VOLTAGE AUTOTRANSFORMER RVSS – REDUCED VOLTAGE SOLID STATE 2S1W – TWO SPEED, ONE WINDING 2S2W – TWO SPEED, TWO WINDING (DIAGRAMMATICALLY SHOWN, CONTRACTOR SHALL FIELD LOCATE)
I / ✱		NON–FUSIBLE DISCONNECT SWITCH, 600 VOLT, 3 POLE ✱ AMPERE RATING NOTED IF OTHER THAN 30A (DIAGRAMMATICALLY SHOWN, CONTRACTOR SHALL FIELD LOCATE)
I ✱ ✱	F	FUSIBLE DISCONNECT SWITCH, 600 VOLT, 3 POLE, ✱ AMPERE RATING AND FUSE SIZE AS NOTED ✱ AMPERE RATING NOTED IF OTHER THAN 30A FUSE RATING (DIAGRAMMATICALLY SHOWN, CONTRACTOR SHALL FIELD LOCATE)
	P 2	MANUAL MOTOR STARTER WITH THERMAL OVERLOAD HEATER, 1 POLE UNLESS OTHERWISE NOTED "P" INDICATES WITH PILOT LIGHT "2" INDICATES TWO POLE (DIAGRAMMATICALLY SHOWN, CONTRACTOR SHALL FIELD LOCATE)
	——	DRAWOUT TYPE EQUIPMENT OR DEVICE
	——	MEDIUM VOLTAGE CABLE TERMINATION
	——	MEDIUM VOLTAGE AIR INTERRUPTER SWITCH
✱	——	MEDIUM VOLTAGE FUSED AIR INTERRUPTER SWITCH ✱ FUSE RATING
	——	MEDIUM VOLTAGE FUSED MOTOR CONTROLLER
XFMR NO. 1 480V KVA 120/208V 3P, 4W	T	TRANSFORMER, RATINGS AND CONNECTIONS AS NOTED. UNLESS OTHERWISE NOTED ON THE SINGLE LINE DIAGRAMS, ALL DRY TYPE TRANSFORMERS SERVICING ADMINISTRATIVE AND LABORATORY SPACES SHALL HAVE A K FACTOR OF 4. ISOLATION TRANSFORMERS SHALL HAVE A K–20 RATING
A TO 5	——	CURRENT TRANSFORMER ✱ QUANTITY A = PRIMARY AMPERES
✱ V TO 120	——	POTENTIAL TRANSFORMER ✱ QUANTITY V = PRIMARY VOLTAGE
	G	GENERATOR, RATINGS AND CONNECTIONS AS NOTED
ATS N S 100A	——	AUTOMATIC OR MANUAL TRANSFER SWITCH NO.1 (ATS–1), (MTS–1) "N" INDICATES NORMAL OR PREFERRED SOURCE "S" INDICATES STANDBY OR ALTERNATE SOURCE 100A INDICATES CONTINUOUS CURRENT RATING
✱	✱	VARIABLE SPEED DRIVE CONTROLLER ✱ D.C. = D.C. DRIVE CONTROLLER SCR = SILICON CONTROLLED RECTIFIER VFD = VARIABLE FREQUENCY DRIVE
#KW	E	UNIT HEATER – ELECTRIC HEATING COIL AND FAN # – RATING
——	U	UNIT HEATER – GAS FIRED, STEAM OR WATER HEATING COIL AND FAN
5	M	MOTOR, NUMERAL INDICATES HORSEPOWER
VS VM ✱	——	VOLTMETER WITH SWITCH, 3 PHASE
AS AM ✱	——	AMMETER WITH SWITCH, 3 PHASE

ONE LINE OR CONTROL DIAGRAM	PLAN	DESCRIPTION
✱	——	METER ✱ WM – WATTMETER WHM – WATTHOUR METER WHDM – WATTHOUR DEMAND METER WHDR – WATTHOUR DEMAND RECORDER PF – POWER FACTOR METER DMU – DIGITAL METERING UNIT TRANSDUCER AX – CURRENT TRANSDUCER WX – WATT TRANSDUCER WHX – WATTHOUR TRANSDUCER
✱	✱	RELAY, NO. AS INDICATED 25 – SYNCHRONISM CHECK RELAY 27 – UNDERVOLTAGE RELAY 32 – DIRECTIONAL POWER RELAY 38 – BEARING PROTECTIVE DEVICE 40 – LOSS OF EXCITATION RELAY 42 – RUNNING CONTACTOR/PILOT RELAY 46 – REVERSE PHASE/PHASE BALANCE/CURRENT RELAY 47 – PHASE SEQUENCE VOLTAGE RELAY 49 – MACHINE OR TRANSFORMER THERMAL RELAY 50/51 – INSTANTANEOUS/TIME OVERCURRENT RELAY 50G – INSTANTANEOUS GROUND 51 – TIME OVERCURRENT RELAY 51G – TIME OVERCURRENT RELAY, GROUNDING RESISTOR TYPE 51N – TIME OVERCURRENT RELAY, RESIDUAL TYPE 51V – TIME OVERCURRENT RELAY WITH VOLTAGE RESTRAINT 51X – AUXILIARY RELAY (TRIPS CB AND ALARMS) 59 – OVERVOLTAGE RELAY 60 – NEGATIVE SEQUENCE VOLTAGE RELAY 62 – TIME DELAY RELAY 63 – OVERPRESSURE RELAY 64 – GENERATOR FIELD GROUND RELAY 67 – AC DIRECTIONAL OVERCURRENT RELAY 74 – ALARM LATCHING RELAY 83 – AUTOMATIC SELECTIVE CONTROL OR TRANSFER RELAY 86 – LOCKING–OUT RELAY 87 – DIFFERENTIAL PROTECTIVE RELAY B – SUFFIX INDICATES "BUS" G – SUFFIX INDICATES "GENERATOR" GF – GROUND FAULT ST – SHUNT TRIP T – SUFFIX INDICATES "TRANSFORMER" X – SUFFIX INDICATES "AUXILIARY"
✱	——	SPECIAL CAPACITOR ✱ SC – SURGE CAPACITOR PF – POWER FACTOR CORRECTION CAPACITOR
✱	——	TUNED POWER FACTOR CORRECTION CAPACITOR
	——	PUSHBUTTON, MOMENTARY CONTACT, SPRING RETURN, NORMALLY CLOSED
	——	PUSHBUTTON, MOMENTARY CONTACT, SPRING RETURN, NORMALLY OPEN
	ES	EMERGENCY STOP PUSHBUTTON WITH RED MUSHROOM HEAD OPERATOR (MAINTAINED CONTACT)
STOP START	PBL	START–STOP PUSHBUTTON CONTROL STATION (MOMENTARY CONTACT) WITH LOCKOUT DEVICE ON STOP
	PBM	START–STOP PUSHBUTTON CONTROL STATION, MAINTAINED CONTACT WITH LOCKOUT DEVICE ON STOP
OFF ON	S/S	OFF/ON SELECTOR SWITCH
L R (XO) (OX)	LR	LOCAL/REMOTE SELECTOR SWITCH
A B C✱ (XOO) (OXO) (OOX)	✱	3 POSITION SELECTOR SWITCH, MAINTAINED CONTACT O–OPEN X–CLOSED POSITION / TOP CONTACT / MIDDLE CONTACT / BOTTOM CONTACT A / X / O / O B / O / X / O C / O / O / X NAMEPLATE (A/B/C) HOA – HAND/OFF/AUTO HOR – HAND/OFF/REMOTE LOR – LOCAL/OFF/REMOTE RSL – RAISE/STOP/LOWER TOA – TEST/OFF/AUTO

GD/VF #	GD/VF #	GAS DETECTOR / VENTILATION FAILURE ALARM
		# INDICATES TYPE OF UNIT
		1=MASTER, 2=REMOTE

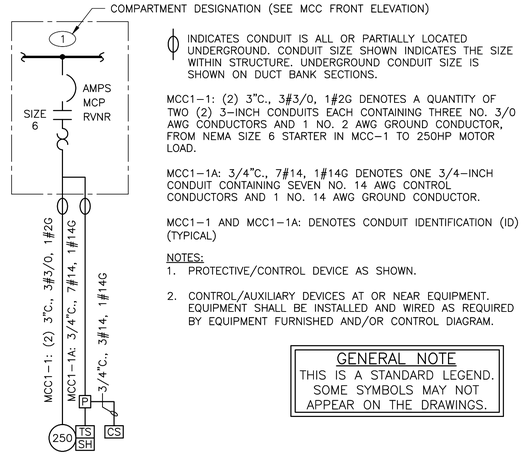
42 #	——	MOTOR STARTER COIL, NUMBER AS INDICATED TO DENOTE INTERLOCKING ONLY
CR #	——	CONTROL RELAY COIL, NUMBER AS INDICATED

ONE LINE OR CONTROL DIAGRAM	PLAN	DESCRIPTION
✱	——	PILOT LIGHT, COLOR AS NOTED ✱ R – RED G – GREEN B – BLUE W – WHITE A – AMBER
✱	——	PILOT LIGHT, PUSH–TO–TEST TYPE, COLOR AS NOTED ABOVE.
✱ RANGE # SETPOINT		TIME DELAY RELAY RANGE AS NOTED SETPOINT AS NOTED # NUMBER AS INDICATED ✱ TDE – TIME DELAY AFTER ENERGIZATION ON DELAY TDD – TIME DELAY AFTER DE–ENERGIZATION OFF DELAY
✱ NOTC		NOTC– NORMALLY OPEN, TIMED CLOSING WHEN ENERGIZED
NCTO		NCTO– NORMALLY CLOSED, TIMED OPENING WHEN ENERGIZED
NOTO		NOTO– NORMALLY OPEN, TIMED OPENING WHEN DE–ENERGIZED
NCTC		NCTC– NORMALLY CLOSED, TIMED CLOSING WHEN DE–ENERGIZED
——	✱ – ##	FIELD INSTRUMENT, TAG NO. AS INDICATED ✱ INDICATES INSTRUMENT TYPE DEFINED ON LOOP SHEETS OR P & ID ## INDICATES LOOP NO.
	LS OR ■	LIQUID LEVEL (FLOAT) SWITCH
		NORMALLY OPEN, CLOSES ON RISING LEVEL
		NORMALLY CLOSED, OPENS ON RISING LEVEL
	PS OR ■	PRESSURE OR VACUUM SWITCH
		NORMALLY OPEN, CLOSES ON RISING PRESSURE
		NORMALLY OPEN, CLOSES ON DROPPING PRESSURE
		NORMALLY CLOSED, OPENS ON RISING PRESSURE
		NORMALLY CLOSED, OPENS ON DROPPING PRESSURE
	TS OR T OR ■	TEMPERATURE SWITCH OR THERMOSTAT
		NORMALLY OPEN, CLOSES ON RISING TEMPERATURE
		NORMALLY OPEN, CLOSES ON DROPPING TEMPERATURE
		NORMALLY CLOSED, OPENS ON RISING TEMPERATURE
		NORMALLY CLOSED, OPENS ON DROPPING TEMPERATURE
	FS OR ■	FLOW SWITCH (AIR, WATER, ETC.)
		NORMALLY OPEN, CLOSES ON INCREASED FLOW
		NORMALLY CLOSED, OPENS ON INCREASED FLOW
	ZS OR ■	POSITION (LIMIT) SWITCH
		NORMALLY OPEN
		NORMALLY OPEN – HELD CLOSED
		NORMALLY CLOSED
		NORMALLY CLOSED – HELD OPEN
	WS OR ■	TORQUE SWITCH
		NORMALLY OPEN, CLOSES ON HIGH TORQUE
		NORMALLY CLOSED, OPENS ON HIGH TORQUE
#	——	UTILIZED IN CONJUNCTION WITH OTHER CONTROL SCHEMATIC SYMBOLS TO DEPICT THE PHYSICAL LOCATION OF THE DEVICE # REPRESENTS LOCATION SEE LOCATION LEGEND ON DRAWING
	——	CONDUCTORS OR CONDUITS CROSSING PATHS BUT NOT CONNECTED
	——	CONDUCTORS ELECTRICALLY CONNECTED
	S	SOLENOID VALVE

ONE LINE OR CONTROL DIAGRAM	PLAN	DESCRIPTION
LA	——	LIGHTNING ARRESTER
		GROUND OR GROUND ROD
30A	——	FUSE, AMPERE RATING AS NOTED
	HTR	STRIP HEATER OR HEATING ELEMENT
	——	INDUCTOR
TG	TG	TACHOMETER GENERATOR
	——	CONTACT, NORMALLY OPEN (NO)
	——	CONTACT, NORMALLY CLOSED (NC)
	——	OVERLOAD RELAY HEATER
✱	——	✱ K = KEY INTERLOCK E = ELECTRICAL INTERLOCK
TB	——	TERMINAL OR TEST BLOCK
RTD	——	RESISTANCE TEMPERATURE DETECTOR
VE OR VE	——	VIBRATION DETECTOR
DM	DM	DAMPER MOTOR
ETM	——	ELAPSED TIME METER
M	M	MOTOR OPERATED VALVE OR GATE
	——	INDICATES LIMITS OF ELECTRICAL EQUIPMENT OR WIRING ENCLOSURE

EXISTING WORK | NEW WORK | FUTURE EXPANSION

EXISTING, NEW OR FUTURE CONDITION DESIGNATION



INDICATES CONDUIT IS ALL OR PARTIALLY LOCATED UNDERGROUND. CONDUIT SIZE SHOWN INDICATES THE SIZE WITHIN STRUCTURE. UNDERGROUND CONDUIT SIZE IS SHOWN ON DUCT BANK SECTIONS.

MCC1–1: (2) 3"C., 3#3/0, 1#2G DENOTES A QUANTITY OF TWO (2) 3–INCH CONDUITS EACH CONTAINING THREE NO. 3/0 AWG CONDUCTORS AND 1 NO. 2 AWG GROUND CONDUCTOR, FROM NEMA SIZE 6 STARTER IN MCC–1 TO 250HP MOTOR LOAD.

MCC1–1A: 3/4"C., 7#14, 1#14G DENOTES ONE 3/4–INCH CONDUIT CONTAINING SEVEN NO. 14 AWG CONTROL CONDUCTORS AND 1 NO. 14 AWG GROUND CONDUCTOR.

MCC1–1 AND MCC1–1A: DENOTES CONDUIT IDENTIFICATION (ID) (TYPICAL)

NOTES:
1. PROTECTIVE/CONTROL DEVICE AS SHOWN.
2. CONTROL/AUXILIARY DEVICES AT OR NEAR EQUIPMENT. EQUIPMENT SHALL BE INSTALLED AND WIRED AS REQUIRED BY EQUIPMENT FURNISHED AND/OR CONTROL DIAGRAM.

GENERAL NOTE
THIS IS A STANDARD LEGEND. SOME SYMBOLS MAY NOT APPEAR ON THE DRAWINGS.

TYPICAL ONE LINE DIAGRAM
SHOWING POWER AND CONTROL TO EQUIPMENT

NOTES:

1. IN GENERAL CONDUIT ROUTING FOR EQUIPMENT AND DEVICES IS NOT SHOWN ON THE PLANS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ROUTING ALL CONDUITS WHICH SHALL INCLUDE CONDUITS SHOWN ON ONE–LINE AND RISER DIAGRAMS AND HOME–RUNS SHOWN ON PLAN DRAWINGS. REFER TO SPECIFICATIONS FOR MATERIALS AND INSTALLATION REQUIREMENTS.
2. THE WIRING DIAGRAMS, QUANTITY AND SIZE OF WIRES AND CONDUITS REPRESENT A SUGGESTED ARRANGEMENT BASED UPON SELECTED STANDARD COMPONENTS OF ELECTRICAL EQUIPMENT. MODIFICATIONS ACCEPTABLE TO THE ENGINEER MAY BE MADE BY THE CONTRACTOR TO ACCOMMODATE EQUIPMENT ACTUALLY PURCHASED. THE BASIC SEQUENCE AND METHOD OF CONTROL MUST BE MAINTAINED AS INDICATED ON THE DRAWINGS AND/OR SPECIFICATIONS.
3. SWITCHGEAR AND MOTOR CONTROL CENTER COMPARTMENT DESIGNATIONS AS INDICATED BELOW:
   - BLANK: NOT INTENDED FOR USE. PLATE ONLY
   - SPACE: EQUIPPED WITH REQUIRED BUS AND HARDWARE FOR THE FUTURE ADDITION OF BREAKERS AND/OR STARTERS WITHIN THE SIZE AND RANGE SHOWN
   - SPARE: CONTAINS A COMPLETELY INSTALLED BREAKER AND/OR STARTER OF SIZE AND TYPE INDICATED FOR FUTURE USE.
4. INTERPRETATION OF ELECTRICAL DRAWINGS: CIRCUIT IDENTIFICATION, ROUTING, AND SIZES OF CONDUITS AND WIRES ARE SHOWN ON THE FOLLOWING DRAWINGS:

A. ONE LINE POWER DIAGRAMS: POWER, CONTROL AND SIGNAL WIRING REQUIREMENTS FOR ELECTRICAL DISTRIBUTION EQUIPMENT AND UTILIZATION EQUIPMENT POWERED FROM SWITCHGEAR, SWITCHBOARDS, MOTOR CONTROL CENTERS AND MAJOR POWER DISTRIBUTION PANELBOARDS ARE TYPICALLY SHOWN ON THE ONE LINE DIAGRAMS. THE PARAMETERS IDENTIFIED ON THE ONE LINE DIAGRAMS ARE: CIRCUIT IDENTIFICATION, CIRCUIT ORIGIN AND DESTINATION, CONDUIT SIZE, WIRE SIZE AND QUANTITY AND TYPE FOR COMPLETE CIRCUIT LENGTH, AND AUXILIARY DEVICES ASSOCIATED WITH THE CONTROL/PROTECTION OF THE POWERED EQUIPMENT, AND SIZE OF THE GROUNDING ELECTRODE CONDUCTORS.

B. INSTRUMENTATION AND CONTROL RISER DIAGRAMS: POWER, CONTROL, SIGNAL AND DATA HIGHWAY WIRING REQUIREMENTS FOR INSTRUMENTS AND CONTROL DEVICES CONTROLLED/MONITORED FROM INSTRUMENTATION AND CONTROL PANELS SUCH AS RTUS, PLCS, TERMINAL CABINETS, AND REMOTE I/O PANELS ARE TYPICALLY SHOWN ON THE INSTRUMENTATION AND CONTROL ONE LINE DIAGRAMS. THE PARAMETERS IDENTIFIED ON THE ONE LINE DIAGRAMS ARE: CIRCUIT IDENTIFICATION, CIRCUIT ORIGIN AND DESTINATION, CONDUIT SIZE, WIRE SIZE, QUANTITY AND TYPE FOR COMPLETE CIRCUIT LENGTH, AND AUXILIARY DEVICES ASSOCIATED WITH THE CONTROL/PROTECTION OF THE POWERED EQUIPMENT.

C. FLOOR PLANS: FOR DETERMINING THE LENGTH OF CIRCUITS LOCATED WITHIN STRUCTURES, FLOOR PLANS SHOW THE LOCATION OF ELECTRICAL DISTRIBUTION EQUIPMENT, CONTROL PANELS, UTILIZATION EQUIPMENT, INSTRUMENTS, ANCILLARY EQUIPMENT AND DEVICES AND THE ANTICIPATED PENETRATION LOCATIONS WHERE CONDUITS EXIT/ENTER THE STRUCTURE. HOMERUNS MAY ALSO BE SHOWN FROM MISCELLANEOUS EQUIPMENT NOT SHOWN ON A ONE LINE OR RISER DIAGRAM.

D. SITE PLANS: FOR DETERMINING THE LENGTH OF CIRCUITS EXTERIOR TO STRUCTURES AND TO IDENTIFY THE SPECIFIC REQUIREMENTS OF THE UNDERGROUND CONDUITS OR DUCT BANKS, SITE PLANS SHOW THE GENERAL ROUTING OF UNDERGROUND CONDUITS AND DUCT BANKS WITH SECTIONS INDICATING THE CONDUIT SIZE, ARRANGEMENT AND CIRCUIT ROUTING.

E. NOTE THAT CONDUIT SIZE WITHIN THE STRUCTURE IS INDICATED ON ONE–LINE DIAGRAM AND UNDERGROUND SIZE IS INDICATED ON DUCT BANK SECTIONS.

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REGISTERED PROFESSIONAL ENGINEER SUNIL KIRTI MEHTA No. E 21688 ELECTRICAL STATE OF CALIFORNIA
6-4-25

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R–13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT
PROJECT No. 521028

ELECTRICAL LEGEND 1

Designed by: A. DINESH	REVIEWED BY:
Date: MAY 2025	6/11/2025
Checked by: M. SHERLY	Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
Date: MAY 2025	APPROVED BY:
Drawn by: V. VIDHU PRIYA	6/11/2025
Date: MAY 2025	Goutam K. Dobey, City Engineer, R.C.E. 75646 DATE
Checked by: M. SEJAL	Sheet 110 of 126 Sheets
Date: MAY 2025	Scale Horiz. X Vert. X

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SYMBOL	DESCRIPTION
A 3 b	LIGHTING FIXTURE "A" – FIXTURE TYPE (SEE LIGHTING FIXTURE SCHEDULE) "b" – CONTROLLED BY SWITCH "b" "3" – CIRCUIT NUMBER
A 3 b	LIGHTING FIXTURE, NOTATIONS SAME AS ABOVE
A 3 b	WALL MOUNTED TYPE LIGHTING FIXTURE, NOTATIONS SAME AS ABOVE
A 3 OR A 3	CROSS HATCH INDICATES LIGHTING FIXTURE THAT IS UNSWITCHED AND SHALL REMAIN ON AT ALL TIMES. NOTATIONS SAME AS ABOVE.
A 3 b OR A 3 b	SHADED AREA INDICATES LIGHTING FIXTURE THAT IS EQUIPPED WITH EMERGENCY BACKUP POWER SOURCE. NOTATIONS SAME AS ABOVE.
A 3	POLE MOUNTED AREA TYPE LIGHTING FIXTURE, NOTATIONS SAME AS ABOVE
A 3	POLE MOUNTED ROADWAY TYPE LIGHTING FIXTURE, NOTATIONS SAME AS ABOVE
EM 3 (*)	EMERGENCY LIGHTING BATTERY UNIT WITH TWO LAMP HEADS "EM" – FIXTURE TYPE (SEE LIGHTING FIXTURE SCHEDULE) "3" – SUPERVISORY CIRCUIT * – FIXTURE TAG #
R–2 BU–1(*)	REMOTE EMERGENCY ADJUSTABLE WALL LIGHTING FIXTURE WITH TWO LAMP HEADS "R–2" – FIXTURE TYPE (SEE LIGHTING FIXTURE SCHEDULE) * – HOME RUN TO BATTERY UNIT INDICATED. CONDUIT SHALL BE 3/4" AND CONTAIN (2) NO. 12 AWG BRANCH CIRCUIT CONDUCTORS AND (1) NO. 12 AWG GROUND CONDUCTOR UNLESS OTHERWISE INDICATED.
A 3	COMBINATION BATTERY UNIT AND EXIT SIGN. FILLED QUADRANT REPRESENTS FACE SIDE OF SIGN.
A 3	CEILING MOUNTED EXIT SIGN, NOTATIONS SAME AS ABOVE. WHEN USED, ARROW INDICATES DIRECTION OF EGRESS. FILLED QUADRANT REPRESENTS FACE SIDE OF SIGN. (DOUBLE FACE DOUBLE CHEVRONS SHOWN)
A 3	WALL MOUNTED EXIT SIGN, NOTATIONS SAME AS ABOVE. WHEN USED, ARROW INDICATES DIRECTION OF EGRESS. FILLED QUADRANT REPRESENTS FACE SIDE OF SIGN.
RH–3 E 3 BU–1(*)	REMOTE EMERGENCY CEILING LIGHTING FIXTURE. "RH–3" – FIXTURE TYPE (SEE LIGHTING FIXTURE SCHEDULE) "3" – SUPERVISORY CIRCUIT * – HOME RUN TO BATTERY UNIT INDICATED. CONDUIT SHALL BE 3/4" AND CONTAIN 2 NO. 12 AWG BRANCH CIRCUIT CONDUCTORS AND 1 NO. 12 AWG GROUND CONDUCTOR UNLESS OTHERWISE INDICATED.
	HOME RUN TO DESIGNATED EQUIPMENT. BRANCH CIRCUIT CONDUIT WITH 2 NO. 12 AWG BRANCH CIRCUIT CONDUCTORS AND 1 NO. 12 AWG GROUND CONDUCTOR UNLESS OTHERWISE NOTED. NUMBER OF ARROWS INDICATE NUMBER OF CIRCUITS. FOR MINIMUM SIZE CONDUIT PERMITTED REFER TO THE SPECIFICATIONS.
	CONDUIT CONCEALED IN WALL, IN SLAB ABOVE, OR ABOVE CEILING.
	CONDUIT CONCEALED IN OR BELOW FLOOR OR UNDERGROUND.
	CONDUIT RUN EXPOSED. RUN PARALLEL OR PERPENDICULAR TO STRUCTURE OR WALL.
	'X' INDICATES EXPLOSION PROOF CONDUIT SEAL FITTING.
	CONCRETE ENCASED DUCTBANK. WIDTH VARIES, SEE DUCTBANK SECTION/DETAILS FOR REQUIREMENTS AND WIDTH
	CONDUIT STUBBED OUT AND CAPPED
(2) 3"C., 3#3/0, 1#2G	DENOTES A QUANTITY OF TWO (2) 3–INCH CONDUITS EACH CONTAINING THREE NO. 3/0 AWG CONDUCTORS AND 1 NO. 2 AWG GROUND CONDUCTOR.
2–2/C#16 SH	DENOTES A QUANTITY OF TWO INSTRUMENT CABLES. EACH CABLE TO CONSIST OF TWO NO. 16 AWG CONDUCTORS TWISTED TOGETHER AND COVERED WITH A METALLIC SHIELD AND AN OVERALL PROTECTIVE JACKET. REFER TO THE SPECIFICATIONS FOR THE EXACT CABLE TO BE PROVIDED.
2–3/C#16 SH	SAME AS ABOVE EXCEPT CABLE TO CONSIST OF THREE NO. 16 AWG CONDUCTORS TWISTED, SHIELDED AND COVERED WITH AN OVERALL PROTECTIVE JACKET. REFER TO THE SPECIFICATIONS FOR THE EXACT CABLE TO BE PROVIDED.
(3) 4"C.	THREE 4–INCH CONDUITS
	FLEXIBLE METAL CONDUIT "WHIP" (3/4"C., 2#12, 1#12G UNLESS OTHERWISE NOTED) FOR LIQUID TIGHT MOTOR CONNECTIONS
	'X' INDICATES CONDUIT SEAL FITTING IN OTHER THAN CODE REQUIRED LOCATIONS.
	INDICATES MOTOR STARTER AND/OR MOTOR CONTROL EQUIPMENT WITHIN THE ENCLOSURE.

SYMBOL	DESCRIPTION
$a	SINGLE POLE SWITCH "a" INDICATES FIXTURES CONTROLLED.
$a 2	DOUBLE POLE SWITCH "a" INDICATES FIXTURES CONTROLLED.
$c 3	THREE WAY SWITCH "c" INDICATES FIXTURES CONTROLLED.
$a 4	FOUR WAY SWITCH "a" INDICATES FIXTURES CONTROLLED.
$a D	DIMMER SWITCH "a" INDICATES FIXTURES CONTROLLED
$OS	SINGLE POLE SWITCH "OS" INDICATES A PASSIVE INFRARED OCCUPANCY SENSOR
$OS 2	DOUBLE POLE SWITCH "OS" INDICATES PROGRAMMABLE OCCUPANCY SENSOR CAPABLE OF INBOARD/OUTBOARD SWITCHING
$DT	SINGLE POLE SWITCH "DT" INDICATES DUAL TECHNOLOGY PROGRAMMABLE OCCUPANCY SENSOR CAPABLE OF SENSING MOTION AND SOUND
C 3	LIGHTING CONTACTOR WITH NUMBER OF POLES AS INDICATED
TM	TIME SWITCH
	PUSH BUTTON STATION
TYPE A	INDICATES ALL LIGHTING FIXTURES WITHIN THE ROOM OR AREA IN WHICH THIS NOTATION APPEARS SHALL BE TYPE "A" UNLESS OTHERWISE NOTED. SEE LIGHTING FIXTURE SCHEDULE FOR TYPES
	LIGHTING PANELBOARD (LP–#) SHOWN ON PLAN PER ACTUAL PANEL DIMENSIONS
	POWER PANELBOARD (PP–#) OR DISTRIBUTION PANELBOARD (DP–#) SHOWN ON PLAN PER ACTUAL PANEL DIMENSIONS
	LIGHTING CONTACTOR PANELBOARD (LCP–#) SHOWN ON PLAN PER ACTUAL PANEL DIMENSIONS
* 4	DUPLEX RECEPTACLE, 20A, 120V, 2P, 3W * GFCI – GROUND FAULT CIRCUIT INTERRUPTER TYPE WP – WEATHERPROOF XP – EXPLOSION PROOF T – TRANSIENT VOLTAGE SURGE SUPPRESSOR IC – ISOLATED GROUND 4 – CIRCUIT NUMBER
* 4	DUPLEX RECEPTACLE, 20A, 120V, 2P, 3W MOUNTED ABOVE COUNTER–TOP OR 42" AFF * NOTATIONS SAME AS ABOVE
* 4	QUADRUPLEX RECEPTACLE, 20A, 120V, 2P, 3W * NOTATIONS SAME AS ABOVE
* 60 3 4W	SPECIAL PURPOSE RECEPTACLE * – VOLT RATING "3" – NUMBER OF POLES "60" – AMPERE RATING "4W" – 4 WIRES IN ADDITION TO GROUND
	MULTI–OUTLET ASSEMBLY, SYMBOL DENOTES RECEPTACLE TYPE
	FLUSH FLOOR OUTLET BOX WITH TYPE OUTLET INDICATED
	UNDER FLOOR DUCT SYSTEM WITH TYPE OUTLETS INDICATED
	THREE CELL UNDER FLOOR DUCT SYSTEM JUNCTION BOX
J OR J	JUNCTION BOX
P	PULL BOX
TC	TERMINAL CABINET
OS	OCCUPANCY SENSOR
PC	PHOTOCELL
ESA	EMERGENCY EYEWASH/SHOWER ALARM STATION WITH FLOW SWITCH(ES)
	INDICATED EQUIPMENT AND MATERIALS TO BE DEMOLISHED
	GROUND SYSTEM GRID OR LOOP, 36" BELOW FINISHED GRADE UNLESS OTHERWISE NOTED.
	EXOTHERMIC WELD CONNECTION
	3/4" x 10'–0" GROUND ROD. UNLESS SPECIFIED OTHERWISE.
	GROUND ROD TEST WELL STATION (SEE DETAIL SHEET FOR REQUIREMENTS)

SYMBOL	DESCRIPTION
	COMMUNICATION SYSTEMS
	PAGE/PARTY TELEPHONE OUTLET FOR WALL TYPE HANDSET, MOUNT UP 4'–6"
K	TELEPHONE OUTLET FOR DESK TYPE HANDSET K = KEY SYSTEM
K	TELEPHONE OUTLET FOR WALL TYPE HANDSET (MOUNT UP 4'–6") K = KEY SYSTEM
	PAGE/PARTY TELEPHONE OUTLET FOR DESK TYPE HANDSET
S H W	PAGING SPEAKER, WALL MOUNTED H = HORN TYPE W = WIDE ANGLE TYPE
S W	PAGING SPEAKER, WALL MOUNTED, BI–DIRECTIONAL, HORN TYPE W = WIDE ANGLE TYPE
S	PAGING SPEAKER, FLUSH MOUNTED CEILING TYPE
S	PAGING SPEAKER, SURFACE MOUNTED CEILING TYPE
VC	REMOTE WALL MOUNTED VOLUME CONTROL FOR CEILING SPEAKER, MOUNT UP 5'–0"
A	PAGING SPEAKER AMPLIFIER ASSEMBLY
TM	TELEPHONE CABINET OR BACKBOARD AS NOTED
P OR C	"C" – DATA INPUT/OUTPUT CABLE OUTLET "P" – PROCESS COMPUTER SYSTEM (CAT6 RJ–45 JACK)
GB	GAS DETECTION/VENTILATION FAILURE WEATHERPROOF DUAL–LITE BEACON MOUNT TOP OF DEVICE UP 6'–8" A.F.F.
15 G	GAS DETECTION/VENTILATION FAILURE HORN/STROBE MOUNT TOP OF DEVICE UP 6'–8" A.F.F.
G	GAS DETECTION/VENTILATION FAILURE HORN, MOUNT TOP OF DEVICE UP 6'–8" A.F.F.
G	GAS DETECTION/VENTILATION FAILURE STROBE, MOUNT TOP OF DEVICE UP 6'–8" A.F.F.
	SECURITY SYSTEMS
SACP	SECURITY ALARM CONTROL PANEL
DS	SECURITY ALARM DOOR SWITCH
K	SECURITY ALARM KEY PAD
R	SECURITY SYSTEM CARD ACCESS READER
WS	SECURITY ALARM WINDOW SWITCH
	SECURITY ALARM MOTION DETECTOR
CCTV	CLOSED CIRCUIT TV CAMERA
PTZ	PAN, TILT, ZOOM CAMERA LENS CONTROLS
GB	GLASS BREAK DETECTOR
	FIRE ALARM SYSTEMS
H 200 R	FIRE ALARM HEAT DETECTOR 135 FIXED TEMPERATURE UNLESS OTHERWISE NOTED. "200" – 200 FIXED TEMPERATURE "R" – FIXED TEMPERATURE RATE–OF–RISE TYPE
I	FIRE ALARM SMOKE DETECTOR PHOTOELECTRIC TYPE UNLESS OTHERWISE NOTED. "I" – IONIZATION TYPE.
D	FIRE ALARM DUCT SMOKE DETECTOR
FACP	FIRE ALARM CONTROL PANEL
FV	FIRE ALARM VENTILATION PANEL WITH GRAPHIC PANEL
FA	REMOTE FIRE ALARM ANNUNCIATOR PANEL
F	FIRE ALARM MASTER BOX
F	FIRE ALARM HORN, MOUNT UP 7'–6"
15 F	FIRE ALARM STROBE, MOUNT UP 6'–8" 15 = CANDELA RATING
15 F	FIRE ALARM HORN AND STROBE LIGHT COMBINATION, MOUNT UP 6'–8" 15 = CANDELA RATING

SYMBOL	DESCRIPTION
F	FIRE ALARM MANUAL PULL STATION, MOUNT UP 4'–0"
VSS	SPRINKLER VALVE SUPERVISORY SWITCH
SFS	SPRINKLER FLOW ALARM SWITCH
F	FIRE ALARM BELL
FB	WEATHERPROOF HI–INTENSITY FIRE ALARM STROBE LIGHT WITH HORN
PIR	PASSIVE INFRARED DETECTOR
R	SMOKE BEAM DETECTOR (RECEIVER)
T	SMOKE BEAM DETECTOR (TRANSMITTER)
	FIRE ALARM SMOKE DETECTOR REMOTE INDICATOR AND TEST SWITCH

ABBREVIATIONS	
A	AMPS
AC	ALTERNATING CURRENT
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AL	ALUMINUM
AIC	AMPERE INTERRUPTING CAPACITY
AMP	AMPERE
ATS	AUTOMATIC TRANSFER SWITCH
AUTO	AUTOMATIC
AUX	AUXILIARY
AWG	AMERICAN WIRE GAUGE
BKR	BREAKER
BLDG	BUILDING
C	CONDUIT
CB	CIRCUIT BREAKER
CGD	COMBUSTIBLE GAS DETECTOR
CKT	CIRCUIT
CLB	CURRENT LIMITING BREAKER
CLF	CURRENT LIMITING FUSE
CP	CONTROL PANEL
CPT	CONTROL POWER TRANSFORMER
CR	CONTROL RELAY
CS	CONTROL SWITCH/CONTROL STATION
CT	CURRENT TRANSFORMER
CU	COPPER
CWS	CONDUIT WALL SEAL
DC	DIRECT CURRENT
DIA	DIAMETER
DMU	DIGITAL METERING UNIT
DN	DOWN
EC	EMPTY CONDUIT
ELEC	ELECTRICAL

ABBREVIATIONS (CONTINUED)	
ELEV	ELEVATION
EM	EMERGENCY
ENCL	ENCLOSURE OR ENCLOSED
EQUIP	EQUIPMENT
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
EX	EXISTING
FO	FIBER OPTIC
FU	FUSE
GCP	GENERATOR CONTROL PANEL
GEN	GENERATOR
G, GND	GROUND
GFI	GROUND FAULT INTERRUPTER
GRS	GALVANIZED RIGID STEEL
HACR	HEATING & AIR CONDITIONING RATED
HH	HANDHOLE
HT	HEIGHT
HID	HIGH INTENSITY DISCHARGE
HP	HORSEPOWER
HZ	HERTZ
ID	IDENTIFICATION
INSTR	INSTRUMENT
K	KILO (PREFIX)
kcmil	1000 CIRCULAR MILS
KVA	KILOVOLT AMPERES
KW	KILOWATTS
LA	LIGHTNING ARRESTER
LTG	LIGHTING
LP	LIGHTING PANEL
LV	LOW VOLTAGE
MAX	MAXIMUM
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCP	MOTOR CIRCUIT PROTECTOR
MDP	MAIN DISTRIBUTION PANEL
MFR	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
MLO	MAIN LUGS ONLY
MTD	MOUNTED
MTS	MANUAL TRANSFER SWITCH
MV	MEDIUM VOLTAGE
N	NEUTRAL
NC	NORMALLY CLOSED
NO	NORMALLY OPEN OR NUMBER
NTS	NOT TO SCALE
OH	OVERHEAD
OL	OVERLOAD
PB	PULL BOX
PCP	PUMP CONTROL PANEL
PH	PHASE
PMH	POWER MANHOLE
PNL	PANEL OR PANELBOARD
PR	PAIR
PRI	PRIMARY
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
RECPT	RECEPTACLE
REQD	REQUIRED
QTY	QUANTITY
SA	SURGE ARRESTER
SEC	SECONDS OR SECONDARY
SH	SHIELDED OR SPACE HEATER
SHH	SIGNAL HANDHOLE
SPD	SURGE PROTECTIVE DEVICE
SS	STAINLESS STEEL
SV	SOLENOID VALVE
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
TC	TIME TO CLOSE OR TRAY CABLE
TEL	TELEPHONE
TO	TIME TO OPEN
TS	TWISTED SHIELDED OR THERMAL SWITCH
TYP	TYPICAL
UG	UNDERGROUND
UPS	UNINTERRUPTIBLE POWER SUPPLY
V	VOLTS
VA	VOLT AMPS
VFD	VARIABLE FREQUENCY DRIVE
W	WATTS, WIDTH, WITH, WIRE
WP	WEATHERPROOF
XP	EXPLOSION PROOF
XFMR	TRANSFORMER

A / E–4 — SHEET NO. WHERE DETAIL IS DRAWN

SYMBOL WHERE THERE IS A DETAIL

DETAIL A, 1/4" = 1'–0" — E–3 — SHEET NO. WHERE THERE IS A DETAIL

SYMBOL WHERE DETAIL IS DRAWN

DETAIL SYMBOL

1 / E–4 — SHEET NO. WHERE SECTION IS DRAWN

SYMBOL WHERE THERE IS A SECTION

SECTION 1, 1/4" = 1'–0" — E–3 — SHEET NO. WHERE SECTION IS TAKEN

SYMBOL WHERE SECTION IS DRAWN

SECTION SYMBOL

GENERAL NOTE
THIS IS A STANDARD LEGEND. SOME SYMBOLS MAY NOT APPEAR ON THE DRAWINGS.

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R–13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

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Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER — SEAL KIRIT MEHTA — No. E 21688 — ELECTRICAL — STATE OF CALIFORNIA

6-4-25

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT
PROJECT No. 521028

ELECTRICAL LEGEND 2

Designed by: A. DINESH — Date: MAY 2025
Checked by: M. SHERLY — Date: MAY 2025
Drawn by: V. VIDHU PRIYA — Date: MAY 2025
Checked by: M. SEJAL — Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, R.C.E. 75646 DATE

Sheet 111 of 126 Sheets
Scale Horiz. X
Vert. X

E-2

WW-00007

XREFs: [Redlands MUED Title Block - 24x36 (xRef)] Images: []
Last saved by: ARAVINDS Time: 5/12/2025 5:44:06 PM
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SCOPE OF WORK:

1. PROJECT PROVIDES IMPROVEMENT AT THE CITY OF REDLANDS WASTEWATER TREATMENT PLANT. MAJOR IMPROVEMENTS INCLUDE, BUT ARE NOT LIMITED TO AS MENTIONED BELOW.
   - UPGRADE LAB FACILITY AND BUILD NEW OFFICE BUILDING.
   - REPLACE THE EXISTING MCC WITH NEW SWITCHBOARD.
   - PROVIDE POWER AND LIGHTING TO NEW OFFICE BUILDING.
   - PROVIDE POWER AND LIGHTING TO UPGRADED LAB.

GENERAL NOTES:

1. ELECTRICAL DRAWINGS ARE INTENDED TO SHOW THE GENERAL LAYOUT OF WORK TO BE INSTALLED UNDER THIS CONTRACT WITHOUT ATTEMPTING TO SHOW ALL DETAILS. FURNISH LABOR, MATERIALS, EQUIPMENT AND INCIDENTALS REQUIRED FOR A COMPLETE AND OPERATIONAL ELECTRICAL SYSTEM AS SHOWN ON THE CONTRACT DOCUMENTS.
2. COORDINATE WORK WITH OTHER TRADES AND THE OWNER.
3. MAINTAIN EXISTING PROCESS OPERATIONS. POWER INTERRUPTIONS TO ELECTRICAL EQUIPMENT SHALL BE AT OWNER'S CONVENIENCE WITH 72 HOURS MINIMUM NOTICE. EACH INTERRUPTION SHALL HAVE PRIOR WRITTEN APPROVAL.
4. FIELD VERIFY EXISTING UNDERGROUND ELECTRICAL CONDUIT, CONCRETE DUCT BANKS, MANHOLES, PULL BOXES, ETC. AND MECHANICAL PIPING. CONTRACTOR SHALL INCLUDE IN BID COSTS ASSOCIATED WITH RELOCATION OR REMOVAL OF UNDERGROUND EQUIPMENT AS REQUIRED BY THIS CONTRACT. USE DUE CARE IN CONGESTED AREAS TO AVOID DAMAGE TO EXISTING UNDERGROUND UTILITIES.
5. CONTRACTOR'S WORK SHALL INCLUDE COMPLETE TESTING OF EQUIPMENT AND WIRING INCLUDING MAKING MINOR CORRECTIONS, CHANGES, OR ADJUSTMENTS NECESSARY FOR THE PROPER FUNCTIONING OF THE SYSTEM AND EQUIPMENT. WORKMANSHIP SHALL BE OF THE HIGHEST QUALITY; SUBSTANDARD WORK WILL BE REJECTED.
6. DO NOT SCALE ELECTRICAL DRAWINGS. REFER TO MECHANICAL, STRUCTURAL DRAWINGS, AND APPROVED MANUFACTURER'S SHOP DRAWINGS FOR EXACT LOCATION OF EQUIPMENT. EXCEPT WHERE DIMENSIONS ARE SHOWN, LOCATIONS OF EQUIPMENT, FIXTURES, OUTLETS, AND SIMILAR DEVICES ARE APPROXIMATE.
7. WORK SHALL COMPLY WITH NEC AND LOCAL CODES.
8. DO NOT SPLICE CONDUCTORS EXCEPT AS NOTED.
9. POWER AND CONTROL CONDUITS SHALL HAVE AN EQUIPMENT GROUNDING CONDUCTOR WIRE SIZED PER TABLE 250.122 OF THE NEC 2023 (UON).
10. COORDINATE SEQUENCE OF CONSTRUCTION WITH CIVIL, MECHANICAL, AND STRUCTURAL DISCIPLINES. PROVIDE TEMPORARY POWER AND CONTROL CIRCUITS AS REQUIRED TO MAINTAIN FACILITY OPERATION. VERIFY EXISTING UTILITIES IN AREA OF CONSTRUCTION. REFER TO CIVIL DRAWINGS FOR ADDITIONAL UNDERGROUND INFORMATION.
11. REPAIR, IN ACCORDANCE WITH SPECIFICATIONS, SIDEWALKS, WALLS, ROADWAYS, ETC. DISTURBED BY CONSTRUCTION ACTIVITIES WHETHER OR NOT SHOWN FOR REPAIR/REPAVING ON CIVIL DRAWINGS.
12. CONCEAL CONDUITS TO GREATEST EXTENT PRACTICABLE. CONDUITS RUN AT EXISTING STRUCTURES SHALL BE RUN EXPOSED.
13. WHERE LOCAL DISCONNECTS AND CONTROL PANELS ARE SHOWN ON PLAN VIEWS, LOCATIONS ARE APPROXIMATE. ADJUST LOCATION AS REQUIRED TO COMPLY WITH NEC ARTICLE 110 FOR WORKING CLEARANCES.
14. DO NOT INSTALL MAJOR CONDUIT RUNS THROUGH AREAS DESIGNATED FOR FUTURE STRUCTURES.

SEISMIC RESTRAINTS:

1. PROVIDE SEISMIC RESTRAINTS FOR ELECTRICAL EQUIPMENT AND SYSTEMS AS REQUIRED BY SECTION 018829.

SUBMITTALS:

1. SUBMIT SHOP DRAWINGS FOR EQUIPMENT, MATERIALS AND OTHER ITEMS FURNISHED UNDER DIVISION 26.
2. SUBMIT CONDUIT SHOP DRAWINGS FOR YARD ELECTRICAL, WITHIN AND UNDER ROADS, BUILDINGS AND STRUCTURES PRIOR TO COMMENCING WORK. DO NOT POUR CONCRETE UNTIL ENGINEER HAS APPROVED THE ASSOCIATED SHOP DRAWING.
3. SUBMIT POWER SYSTEM STUDY IN ACCORDANCE WITH SECTION 260573.
4. SUBMIT OPERATION AND MAINTENANCE MANUALS FOR EQUIPMENT FURNISHED UNDER DIVISION 26.
5. SUBMIT STARTUP/COMMISSIONING PLANS FOR EQUIPMENT FURNISHED UNDER DIVISION 26.
6. SUBMIT TESTING AND SERVICE REPORTS FOR EQUIPMENT AND MATERIALS FURNISHED UNDER DIVISION 26.
7. SUBMIT TRAINING PLANS FOR EQUIPMENT FURNISHED UNDER DIVISION 26.
8. SUBMIT RECORD DOCUMENTATION TO ACCURATELY SHOW COMPLETED INSTALLATION. INCLUDE MODIFICATIONS TO CONTRACT DOCUMENTS (ONE LINE POWER DIAGRAMS, EQUIPMENT ELEVATIONS, PANEL SCHEDULES, ELEMENTARY CONTROL DIAGRAMS, RISER DIAGRAMS, PLANS, CONDUIT AND DUCTBANK ROUTING, ETC) ALONG WITH ADDITIONAL DRAWINGS OR SKETCHES CREATED TO CONVEY COMPLETED INSTALLATION.

INTERPRETATION OF CONTRACT DOCUMENTS:

1. IF DURING PERFORMANCE OF WORK, THERE IS A CONFLICT, ERROR, OR DISCREPANCY BETWEEN OR AMONG CONTRACT DOCUMENTS AND LAWS AND REGULATIONS, PROVIDE THE HIGHER PERFORMANCE STANDARD UNLESS OTHERWISE DIRECTED BY ENGINEER.
2. PRIORITY OF DOCUMENTS: FIGURED DIMENSIONS GOVERN OVER SCALED DIMENSIONS, DETAILED DRAWINGS GOVERN OVER GENERAL DRAWINGS, LARGER SCALE DRAWINGS TAKE PRECEDENCE OVER SMALLER SCALE DRAWINGS, CHANGE ORDER DRAWINGS SUPERCEDE ORIGINAL CONTRACT DRAWINGS, AND CONTRACT DRAWINGS GOVERN SHOP DRAWINGS.
3. IN GENERAL, DRAWINGS DO NOT SHOW CONDUIT ROUTING. PLAN AND ROUTE CONDUITS IN COMPLIANCE WITH SPECIFICATIONS AND DRAWING DETAILS. COORDINATE INSTALLATION WITH OTHER TRADES AND ACTUAL SUPPLIED EQUIPMENT.
4. DUCTBANK ROUTING SHOWN ON ELECTRICAL SITE PLANS IS DIAGRAMMATIC IN NATURE AND MAY NOT INCLUDE INTERFERENCES THAT MAY BE PRESENT.
5. SEE ADDITIONAL NOTES ON ELECTRICAL LEGEND I SHEET.

ENCLOSURE TYPES:

PROVIDE THE FOLLOWING NEMA TYPE ELECTRICAL ENCLOSURES, UNLESS OTHERWISE NOTED:

1. NEMA 1 IN DRY, NON-PROCESS INDOOR LOCATIONS.
2. NEMA 12 IN "DUST" LOCATIONS SHOWN ON THE DRAWINGS.
3. NEMA 4X IN OUTDOOR LOCATIONS, ROOMS BELOW GRADE INCLUDING BASEMENTS AND BURIED VAULTS AND "DAMP" OR "WET" LOCATIONS SHOWN ON THE DRAWINGS.

MATERIALS AND EQUIPMENT:

1. PROVIDE NEW MATERIALS AND EQUIPMENT UNLESS SPECIFICALLY NOTED OTHERWISE.
2. ELECTRICAL EQUIPMENT AND MATERIALS SHALL BE LISTED BY UNDERWRITER'S LABORATORIES, INC., AND SHALL BEAR APPROPRIATE UL LISTING MARK OR CLASSIFICATION MARKING. EQUIPMENT, MATERIALS, ETC. UTILIZED NOT BEARING A UL CERTIFICATION SHALL BE FIELD OR FACTORY UL CERTIFIED PRIOR TO EQUIPMENT ACCEPTANCE AND USE.
3. PROVIDE MAJOR ELECTRICAL EQUIPMENT BY A SINGLE MANUFACTURER: I.E. UNIT SUBSTATIONS, SWITCHGEAR, MOTOR CONTROL CENTERS, DISCONNECT SWITCHES, TRANSFORMERS, PANELBOARDS, ETC.

EQUIPMENT SIZE, HANDLING AND STORAGE:

1. COORDINATE WITH EQUIPMENT MANUFACTURER SHIPPING SPLITS TO PERMIT SAFE HANDLING AND PASSAGE OF EQUIPMENT TO FINAL INSTALLATION LOCATION.
2. COMPLY WITH MANUFACTURER'S INSTRUCTIONS FOR UPRIGHT EQUIPMENT ORIENTATION DURING TRANSPORTATION.
3. PROTECT EQUIPMENT FROM MECHANICAL INJURY, OR EXPOSURE TO MOISTURE, CHEMICALS, OR CORROSIVE GASES. DO NOT STORE ELECTRICAL EQUIPMENT OUTDOORS.
4. PROVIDE AND ENERGIZE TEMPORARY SPACE HEATERS IF REQUIRED TO CONTROL MOISTURE DURING STORAGE.

CUTTING AND PATCHING:

1. CUT AND PATCH IN A WORKMANLIKE MANNER AS REQUIRED TO INSTALL ELECTRICAL WORK.
2. CUTTING OF STRUCTURAL MEMBERS SUCH AS JOISTS, BEAMS, GIRDERS OR COLUMNS IS PROHIBITED.
3. PATCH SURFACES TO RESTORE TO ORIGINAL INTEGRITY (WATERPROOF OR FIREPROOF AS REQUIRED) AND APPEARANCE.
4. CORE DRILL HOLES IN CONCRETE FLOORS AND WALLS AS REQUIRED. PRIOR TO CORING CONCRETE, SCAN SLAB OR WALL USING RADAR TO LOCATE AND IDENTIFY REBAR AND/OR CONDUIT AND WIRING. LOCATE CORES AS TO AVOID CUTTING OR DRILLING THROUGH REBAR AND/OR CONDUITS. SPACE CONDUITS SO AS NOT TO ALTER THE STRUCTURAL INTEGRITY OF THE EXISTING STRUCTURE BEING CORE DRILLED. NOTIFY ENGINEER IMMEDIATELY IF ANY REBARS ARE CUT OR UPON BECOMING AWARE OF DISCREPANCIES WITHIN AREA OF WORK.

DEMOLITION AND DISPOSITION OF EQUIPMENT:

1. DRAWING PLANS SHOWING REMOVAL OF MAJOR MECHANICAL AND ELECTRICAL EQUIPMENT IS NOT INTENDED TO SHOW ALL COMPONENTS TO BE DEMOLISHED. NOT ALL PIPING, CONDUITS, DUCTS, EQUIPMENT, ANCILLARY DEVICES, ETC. ARE SHOWN. THE CONTRACTOR IS TO FIELD VERIFY EXISTING CONDITIONS PRIOR TO BID.
2. UNLESS OTHERWISE SPECIFICALLY NOTED, REMOVE UNUSED EXPOSED CONDUIT AND SUPPORT SYSTEMS BACK TO SOURCE AND/OR POINT OF CONCEALMENT INCLUDING ABOVE ACCESSIBLE CEILING FINISHES. WIRING SHALL BE REMOVED.
3. CUT FLUSH WITH SLAB, CEILING, OR WALL ABANDONED CONCEALED CONDUIT. SUITABLY PLUG CONDUITS.
4. REPAIR AND RESTORE ADJACENT CONSTRUCTION AND FINISHES AFTER DEMOLITION IS COMPLETE.
5. MATERIAL AND EQUIPMENT INDICATED FOR REMOVAL OR DEMOLITION IS TO BECOME CONTRACTOR'S PROPERTY UPON REMOVAL, UNLESS NOTED OTHERWISE. REMOVED MATERIAL TO BE PROPERLY HANDLED AND DISPOSED.

CLEANING:

1. REMOVE ALL RUBBISH AND DEBRIS FROM INSIDE AND AROUND ELECTRICAL EQUIPMENT AND ENCLOSURES.
2. REMOVE DIRT, DUST OR CONCRETE SPATTER FROM INTERIOR AND EXTERIOR OF EQUIPMENT USING BRUSHES, VACUUM CLEANER OR CLEAN LINT-FREE RAGS. DO NOT USE COMPRESSED AIR.

DELEGATED DESIGN / PROFESSIONAL ENGINEERING SERVICES:

1. WHEN ENGINEERING SERVICES ARE SPECIFIED TO BE PROVIDED BY CONTRACTOR, CONTRACTOR SHALL RETAIN A LICENSED PROFESSIONAL ENGINEER TO PERFORM THE SERVICES. ENGINEER SHALL BE LICENSED AT THE TIME SERVICES ARE PERFORMED AND LICENSED IN THE STATE IN WHICH PROJECT IS LOCATED. IF THE STATE ISSUES DISCIPLINE SPECIFIC LICENSES, ENGINEER SHALL BE LICENSED IN THE APPLICABLE DISCIPLINE. ENGINEER SHALL BE EXPERIENCED IN THE TYPE OF WORK BEING PERFORMED.
2. ENGINEERING WORK SHALL BE DONE ACCORDING TO THE APPLICABLE REGULATIONS FOR PROFESSIONAL ENGINEERS TO INCLUDE SIGNING, SEALING AND DATING DOCUMENTS.

B

VOLTAGE DROP CALCULATION

Voltage Drop three phase = sqrt. (3) * Z * I * L / # Parallel Runs
Voltage Drop Single Phase = 2 * Z * I * L / # Parallel Runs

Where: R = Alternating Current Resistance for Uncoated Copper Wires per NEC (2017) Table 9
X = Reactance for All Wires per NEC (2017) Table 9
pf = Power Factor
I = Load Current
L = Circuit Length

Sample Calculation for P1, 480V three phase circuit

Conductor Size : 2/0 AWG	Z = 0.01*.85+0.043*sin(arccos(.85))
Conduit Type : PVC	Z = 0.11 Ω/1000'
Resistance R = 0.010 Ω/10	Voltage Drop = sqrt (3) * 0.11*66*800
Reactance X = 0.043 Ω/100	Voltage Drop = 9.84 V
Power Factor pf = 0.85	% Voltage Drop = 9.84/480 * 100
Load Current I = 66 A	% Voltage Drop = 2.05%
Circuit Length L = 800 ft	

VOLTAGE DROP CALCULATION																	
CIRCUIT NUMBER	FROM	TO	LOAD	UNIT	VOLTS	PHASE	POWER FACTOR	CIRCUIT LENGTH	WIRE SIZE	WIRE TYPE	PARALLEL RUNS	CONDUIT	RESISTANCE OHMS/1000 FT	REACTANCE OHMS/1000 FT	TOTAL IMPEDANCE/ 1000 FT	LOAD CURRENT	VOLTAGE DROP	% VOLTAGE DROP
	SWGR M	SWBD OB	300.5	KVA	480	3	0.85	800	350	CU	2	PVC	0.038	0.04	0.053	361.4	13.37	3%

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REGISTERED PROFESSIONAL ENGINEER — SEJAL KIRIT MEHTA — No. E 21688 EXP. 12-31-26 — ELECTRICAL — STATE OF CALIFORNIA

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R=13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
B	ADDENDUM 2	8/22	SM	SM

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT PROJECT No. 521028

ELECTRICAL GENERAL NOTES

Designed by: A. DINESH
Date: MAY 2025
Checked by: M. SHERLY
Date: MAY 2025
Drawn by: V. VIDHU PRIYA
Date: MAY 2025
Checked by: M. SEJAL
Date: MAY 2025

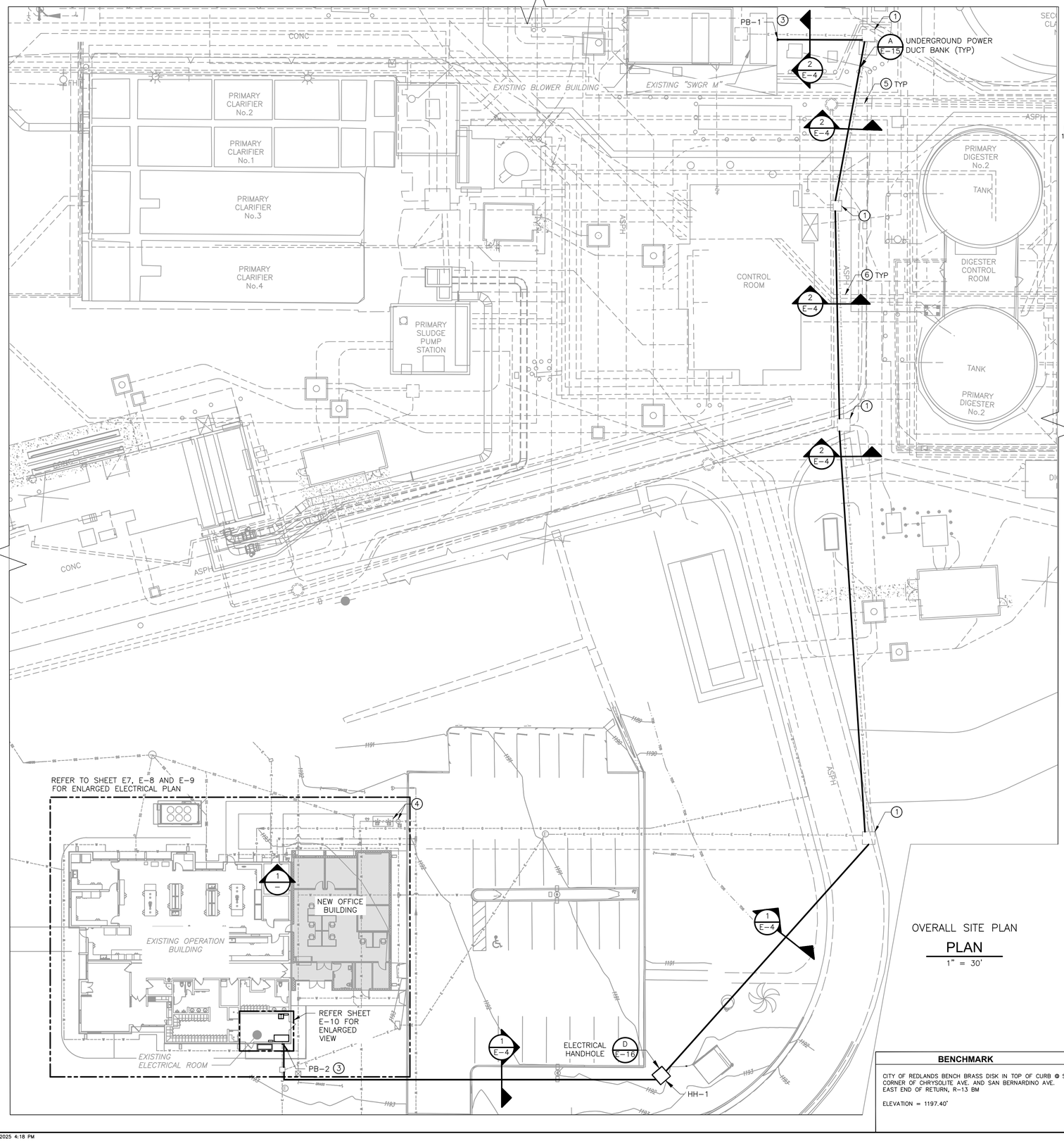
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, R.C.E. 75646 DATE

Sheet 112 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

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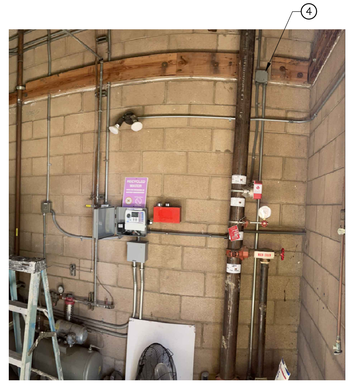
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OVERALL SITE PLAN

PLAN

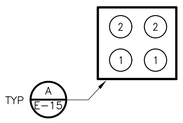
1" = 30'



MECHANICAL ROOM

PHOTOGRAPH 1

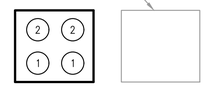
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ELECTRICAL DUCTBANK

SECTION 1

NTS



ELECTRICAL DUCTBANK

SECTION 2

NTS

GENERAL NOTES:

1. THIS DRAWING IS FOR GUIDANCE IN THE GENERAL ROUTING OF THE RACEWAY SYSTEM(S). EXACT ROUTING LOCATIONS, DISTANCES, AND LEVELS SHALL BE GOVERNED BY ACTUAL FIELD CONDITIONS.
2. CONTRACTOR TO COMPLETE ALL ELECTRICAL ACCORDINGLY AS NOT ALL LINES/FEEDS ARE SHOWN. REFER TO ONE-LINES FOR ADDITIONAL INFORMATION.
3. COORDINATE ALL DUCTBANK ROUTING WITH CIVIL AND PIPING. RELOCATE DUCTBANKS AS NEEDED TO AVOID CONFLICTS.
4. CONTRACTOR SHALL FIELD VERIFY ALL NEW UNDERGROUND CONDUIT ROUTING AND CROSSINGS WITH ALL OTHER NEW AND EXISTING UNDERGROUND INFRASTRUCTURE.
5. EXACT CONDUIT ROUTING SHALL BE COORDINATED IN THE FIELD.
6. ALL EXTERIOR FASTENERS, UNISTRUT AND ASSOCIATED MOUNTING MATERIALS SHALL BE 316 STAINLESS STEEL.
7. ALL WORK SHALL COMPLY WITH NEC AND LOCAL CODE.
8. NEMA RATING FOR ELECTRICAL EQUIPMENT:
   NEMA 1: INDOOR AREAS
   NEMA 12: MECHANICAL ROOM AND STORAGE ROOM
   NEMA 4/4X: OUTDOOR AREAS

KEY NOTES:

1. NEW DUCTBANK SHALL BE ROUTED THROUGH EXISTING MANHOLES AND HANDHOLES.
2. MAINTAIN THE SAME LENGTH OF PARALLELED CONDUITS FOR THE MAIN FEEDER.
3. PULLBOX SIZING SHALL COMPLY WITH NEC AND LOCAL CODE.
4. CONTRACTOR SHALL RUN NEW CONDUIT FROM EXISITNG JB INSIDE THE MECHANICAL ROOM AS SHOWN IN PHOTO 1 TO NEW LOCATION OF PIV AND BACKFLOW AS SHOWN ON SITE PLAN FOR NEW TAMPER SWITCHES. THE NEW CABLE SHALL BE ROUTED FROM TS TO FACP. REFER TO FA-2 AND FA-3 FOR DETAILS.
5. PROTECT EXISTING UTILITIES IN-PLACE, CONTRACTOR TO POTHOLE AND FIELD VERIFY POTENTIAL UTILITIES CONFLICT PRIOR TO INSTALLATION OF THE NEW DUCT BANK ADJACENT TO THE EXISTING DUCT BANK. ALL SURFACE FEATURES REMOVED OR DAMAGED SHALL BE REPAIRED OR REPLACED IN KIND.
6. RESTORE PAVEMENT REMOVED BY TRENCHING TO MATCH WITH EXISTING PAVEMENT WITH BACKFILL MATERIAL COMPACTED AT 95% RELATIVE COMPACTION. FINISH GRADE SHALL FLUSH WITH EXISTING SURFACE FOR PROPER DRAINAGE.

CONDUIT NO	CONDUIT TAG	CONDUIT SIZE	DESCRIPTION	
			FROM	TO
2 → 1	SWBD OB-1	2 SETS OF 3"C	EXISTING PARTIAL "SWGR M" LOCATED AT BLOWER BUILDING	"SWBD OB" LOCATED AT ELECTRICAL ROOM IN EXISTING OPERATION BUILIDING
2	SP	1-3"C W/ PULL STRING	PB-1	PB-2

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REGISTERED PROFESSIONAL ENGINEER SEJAL KIRIT MEHTA No. E 21688 ELECTRICAL STATE OF CALIFORNIA

6-4-25

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R=13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS

Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT PROJECT No. 521028

ELECTRICAL
OVERALL SITE PLAN

Designed by:	A. DINESH	REVIEWED BY:	6/11/2025
Date:	MAY 2025	Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200	DATE
Checked by:	M. SHERLY	APPROVED BY:	6/11/2025
Date:	MAY 2025	Goutam K. Dobey, City Engineer, R.C.E. 75646	DATE
Drawn by:	V. VIDHU PRIYA	Sheet 113 of 126 Sheets	
Date:	MAY 2025	Scale Horiz. .X	
Checked by:	M. SEJAL	Vert. .X	
Date:	MAY 2025		

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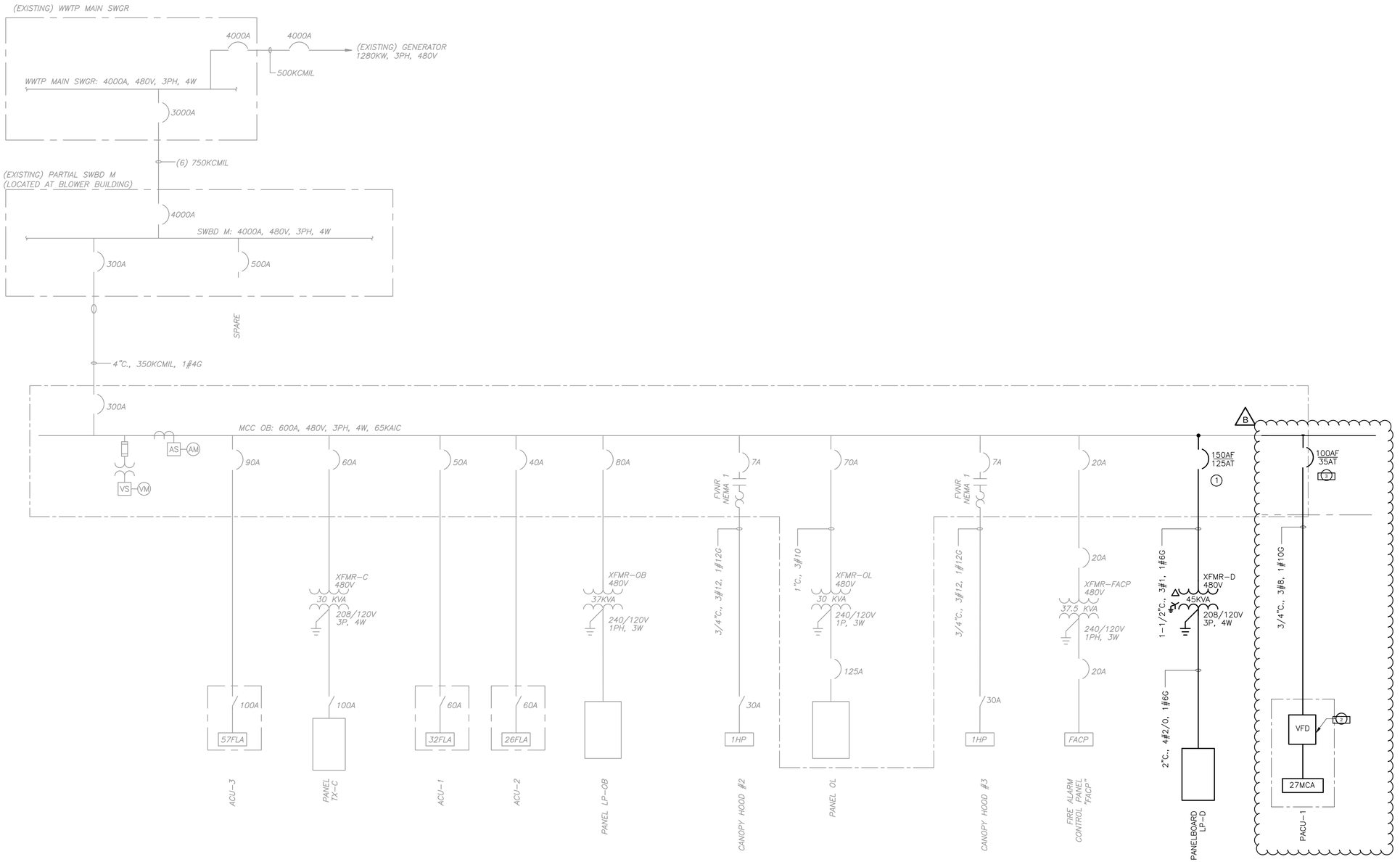
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KEY NOTE:

B

1. PROVIDE TEMPORARY FEEDER FROM MCC OB TO STEPDOWN TRANSFORMER XFMR-D.
2. PROVIDED BY VENDOR.
3. CONTRACTOR TO REPLACE SPARE CIRCUIT BREAKER WITH NEW CIRCUIT BREAKER AND PROVIDE TEMPORARY FEEDER FROM MCC OB TO PACU-1.



EXISTING MCC OB

ONE-LINE DIAGRAM

NTS

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REGISTERED PROFESSIONAL ENGINEER — SEJAL KIRIT MEHTA — No. E 21688 EXP. 12-31-26 — ELECTRICAL — STATE OF CALIFORNIA

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
B	ADDENDUM 2	8/22	SM	SM

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT
PROJECT No. 521028

ELECTRICAL EXISTING MCC OB ONELINE DIAGRAM

Designed by: A. DINESH
Date: MAY 2025
Checked by: M. SHERLY
Date: MAY 2025
Drawn by: V. VIDHU PRIYA
Date: MAY 2025
Checked by: M. SEJAL
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, R.C.E. 75646 DATE

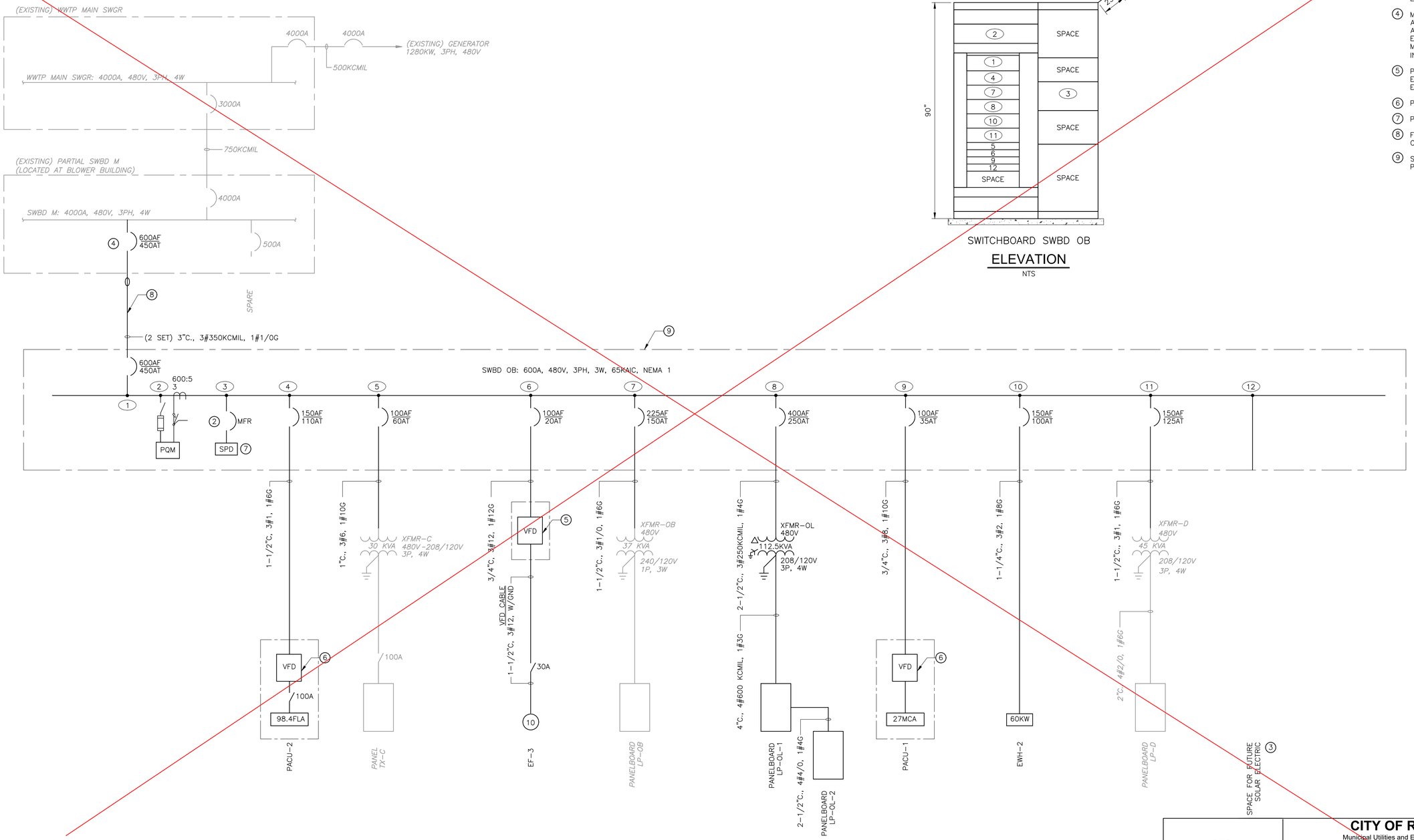
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Vert. AS SHOWN

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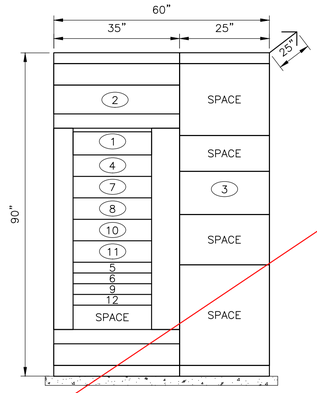
NOT IN SCOPE- PHASE 2



SWBD OB

ONE-LINE DIAGRAM

NTS



SWITCHBOARD SWBD OB

ELEVATION

NTS

KEY NOTES:

1. PROVIDED BY MANUFACTURER.
2. BREAKER RATING DETERMINED BY MANUFACTURER.
3. PROVIDE LABEL "FOR FUTURE SOLAR ELECTRIC".
4. MODIFY EXISTING SWBD COMPARTMENT AND PROVIDE NEW IDENTIFICATION PLATE, AND ALL OTHER NECESSARY ANCILLARY EQUIPMENT. CIRCUIT BREAKER SHALL MATCH EXISTING SWBD IN ALL RESPECT INCLUDING, SHORT CIRCUIT RATING (KAIC).
5. PROVIDED BY VENDOR. INSTALLED BY ELECTRICAL CONTRACTOR AND LOCATED IN ELECTRICAL ROOM.
6. PROVIDED BY VENDOR.
7. PROVIDE TYPE 2 SPD FOR SWBD.
8. FEEDER TO SWBD OB WILL BE ROUTED ON PHASE 1.
9. SWBD OB WILL BE INSTALLED ON PHASE 2.

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R=13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	8/15	SM	SM

Revisions

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REGISTERED PROFESSIONAL ENGINEER SEJAL KIRIT MEHTA No. E 21688 ELECTRICAL STATE OF CALIFORNIA

6-4-25

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT
PROJECT No. 521028

ELECTRICAL SWBD OB
ONELINE DIAGRAM

Designed by: A. DINESH
Date: MAY 2025
Checked by: M. SHERLY
Date: MAY 2025
Drawn by: V. VIDHU PRIYA
Date: MAY 2025
Checked by: M. SEJAL
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, R.C.E. 75646 DATE

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E-5B

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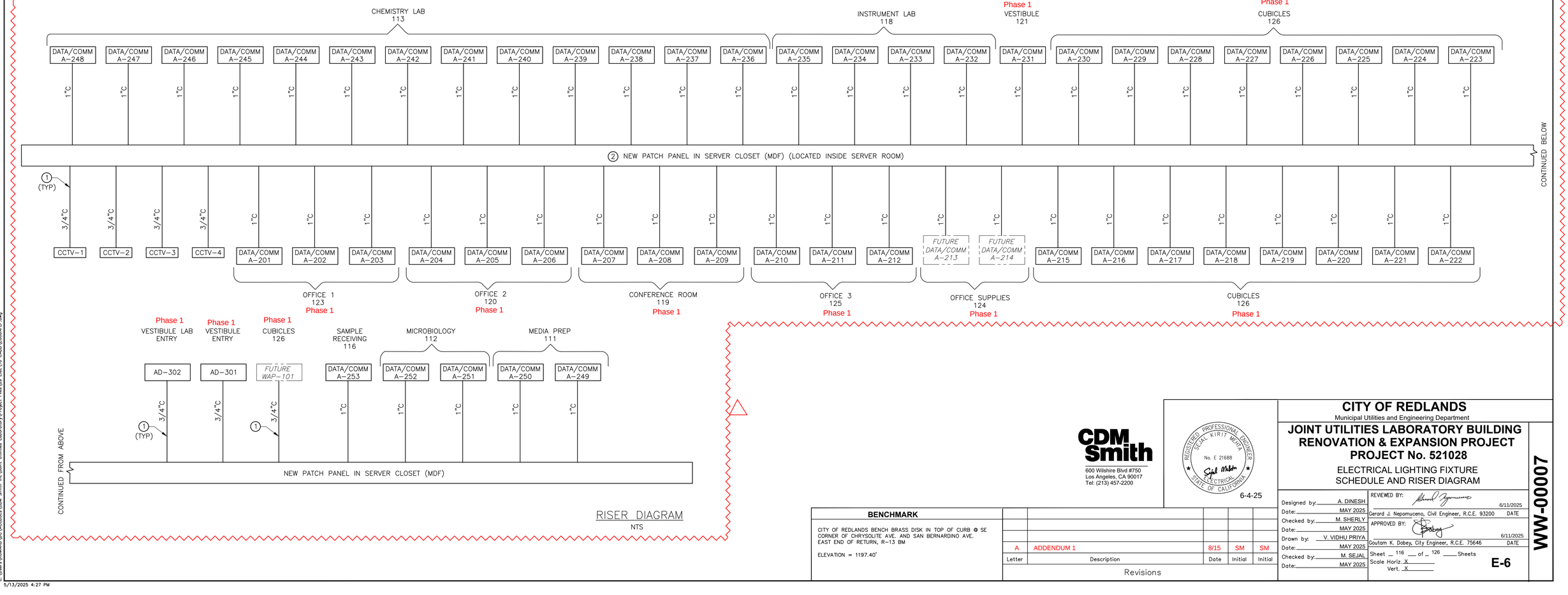
LIGHTING FIXTURE SCHEDULE

TYPE	LAMPS	MOUNTING	DESCRIPTION	VOLTAGE	MINIMUM LUMEN OUTPUT	MAXIMUM WATTAGE	MANUFACTURER
AL1	LED	RECESS	2' X 4' LED TROFFER, LAY IN GRID, 80 CRI, 4000K, SMOOTH FROSTED ACRYLIC	120V	4178	30.3	COOPER METALUX 24CZ2-40-S-UNV-L840-CD1 OR EQUAL
AL1E	LED	RECESS	2' X 4' LED TROFFER, LAY IN GRID, 80 CRI, 4000K, SMOOTH FROSTED ACRYLIC , AND EMERGENCY BATTERY PACK	120V	4178	30.3	COOPER METALUX 24CZ2-40-S-UNV-EL10W-L840-CD1 OR EQUAL
AL2	LED	SUSPENDED	48" LED, SURFACE OR SUSPENDED, 80CRI, 4000K, ACRYLIC LOW PROFILE FROSTED LENS	120V	4009	23.8	LITHONIA LIGHTING FEM-L48-4000LM-LPAFL-MD-MVOLT-GZ10-40K-80CRI OR EQUAL
AL2E	LED	SUSPENDED	48" LED, SURFACE OR SUSPENDED, 80CRI, 4000K, ACRYLIC LOW PROFILE FROSTED LENS AND EMERGENCY BATTERY PACK	120V	4009	23.8	LITHONIA LIGHTING FEM-L48-4000LM-LPAFL-MD-MVOLT-GZ10-40K-80CRI-E10WMCP OR EQUAL
AL3	LED	SURFACE	RECESSED 6-INCH LED LENS DOWNLIGHT WITH INTEGRAL CLEAR LENS, SEMI-SPECULAR CLEAR FINISH, WET LOCATION LISTED, 80 CRI, 4000K COLOR TEMPEARTAURE	120V	1500	14.2	COOPER LIGHTING HC6-15-D010-HM6-15-840-61MD-W OR EQUAL
AL3E	LED	SURFACE	RECESSED 6-INCH LED LENS DOWNLIGHT WITH INTEGRAL CLEAR LENS SEMI-SPECULAR CLEAR FINISH, WET LOCATION LISTED, 80 CRI, 4000K COLOR TEMPEARTAURE, AND EMERGENCY BATTERY PACK	120V	1500	14.2	COOPER LIGHTING HC6-15-D010-REM7-HM6-15-840-61MD-W OR EQUAL
LL2	LED	PENDANT	LINEAR SUSPENDED LED FIXTURE, 100% DOWNLIGHT, 8 FOOT, 120V, DAMP LOCATION RATED, FROSTED CONTINUOUS LENS, DIMMABLE, WHITE FINISH, EXTRUDED ALUMINUM HOUSING, ADJUSTABLE AIRCRAFT CABLE, POLYESTER POWDERCOAD FINISH	120V	12080	138	COOPER LIGHTING CTA F 0100 60L840 1D UNV SR LWIPD1 WAC 8
LL2E	LED	PENDANT	LINEAR SUSPENDED LED FIXTURE, 100% DOWNLIGHT, 8 FOOT, 120V, DAMP LOCATION RATED, FROSTED CONTINUOUS LENS, DIMMABLE, WHITE FINISH, EXTRUDED ALUMINUM HOUSING, ADJUSTABLE AIRCRAFT CABLE, POLYESTER POWDERCOAD FINISH WITH EMERGENCY BATTERY BACKUP	120V	12080	138	COOPER LIGHTING CTA F 0100 60L840 1D UNV SR LWIPD1 B10 WAC 8
WL1E	LED	WALL	D-SERIES SIZE 1 LED WALL LUMINAIRE WITH EMERGENCY BATTERY BACKUP, WITH PHOTOCELL, DARK BRONZE FINISH	120V	3993	35	D-SERIES SIZE1 DSXW1 LED 20C 530 30K T3M MVOLT PE E20WC DDBXD OR EQUAL IN ACUITY BRANDS
WL2E	LED	SURFACE	ROUND SURFACE MOUNT DOWNLIGHT,12 INCH DIAMETER 90CRI, 4000K, WET LOCATION LISTED, MATT WHITE FINISH, WITH EMERGENCY BATTERY BACKUP	120V	2255	26.85	COPPER LIGHTING SMD12R 20 9S-WH-E-EM OR EQUAL
E1	LED	UNIVERSAL	EXIT SIGN SINGLE FACE SELF POWERED WITH RED LETTERS, WHITE FINISH, MAINTENANCE FREE SEALED NICKEL-CADMIUM BATTERY WITH 90 MINUTES OF EMERGENCY POWER, SELF DIAGNOSTICS	120V		1.3	LITHONIA LE S W 1 R EL N SD OR EQUAL
OS	-	-	360 PASSIVE INFRARED LINE VOLTAGE OCCUPANCY SENSOR WITH LIGHT LEVEL FEATURE	120V	-	-	LEGRAND CI-355 OR EQUAL

KEY NOTES:

1. THE CONDUCTOR WILL BE PROVIDED BY OTHERS.
2. COMBINE CONTROL AND CAT6 CIRCUITS AS MUCH AS POSSIBLE TO LIMIT NUMBER OF CONDUIT GOING TO PATCH PANEL.

LIGHTING FIXTURE
SCHEDULE
NTS



RISER DIAGRAM
NTS

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REGISTERED PROFESSIONAL ENGINEER
SEJAL KIRIT MEHTA
No. E 21688
ELECTRICAL
STATE OF CALIFORNIA
6-4-25

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R=13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	8/15	SM	SM

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT
PROJECT No. 521028

ELECTRICAL LIGHTING FIXTURE SCHEDULE AND RISER DIAGRAM

Designed by: A. DINESH Date: MAY 2025
Checked by: M. SHERLY Date: MAY 2025
Drawn by: V. VIDHU PRIYA Date: MAY 2025
Checked by: M. SEJAL Date: MAY 2025

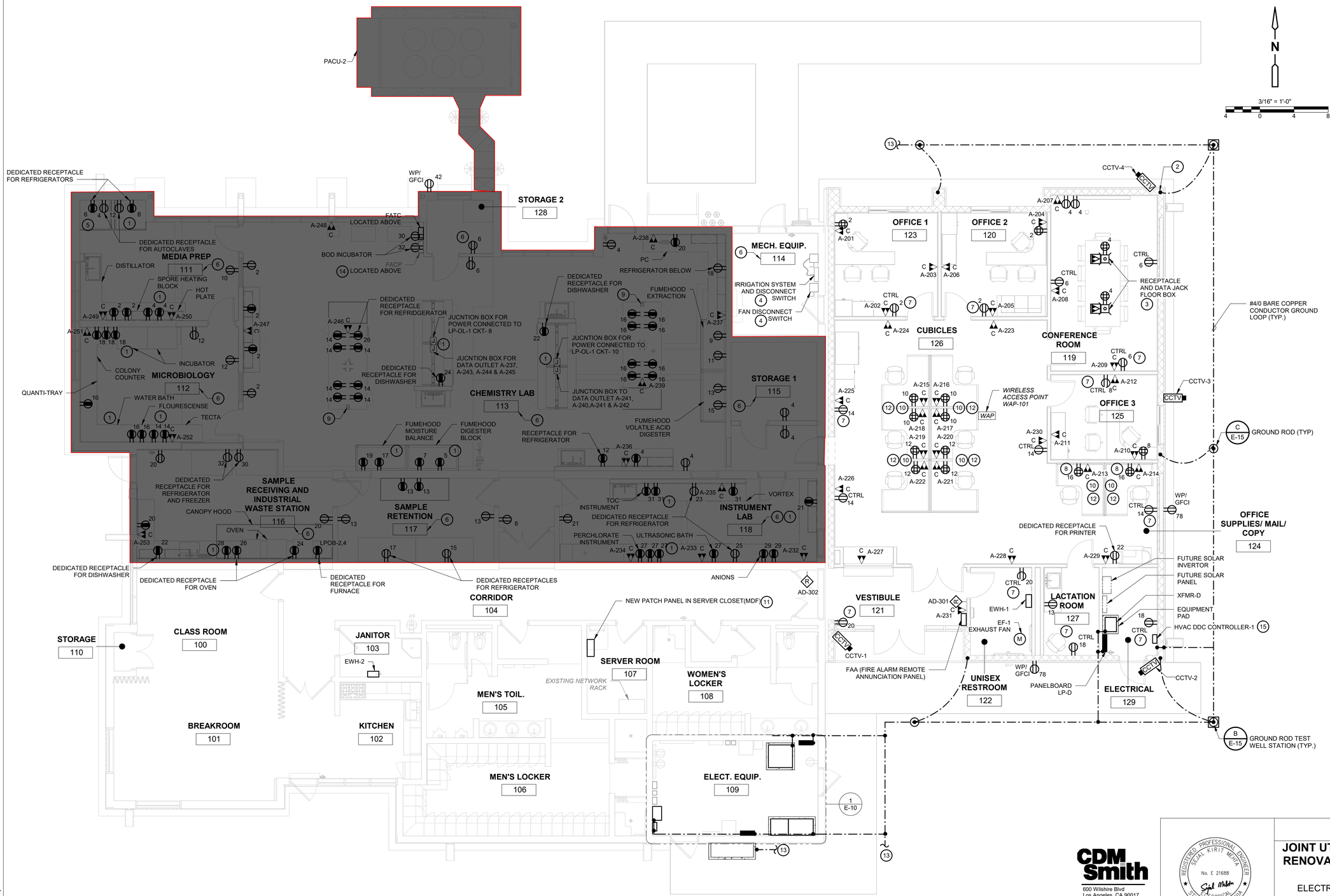
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, R.C.E. 75646 DATE

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GENERAL NOTES:

1. MOUNT RECEPTACLES 18-INCHES ABOVE FINISHED FLOOR UNLESS OTHERWISE NOTED.
2. ALL RECEPTACLES SHOWN IN THIS SHEET ARE FED FROM PANELBOARD PANEL D & PANEL OL UNLESS OTHERWISE NOTED.
3. TWO DROPS SHALL BE CONSIDERED FOR DATA OUTLET, CCTV AND WIRELESS ACCESS POINTS.
4. PRIOR TO CORING CONCRETE IN EXISTING BUILDING, SCAN SLAB OR WALL TO LOCATED REBAR AND/OR CONDUIT AND WIRING.
5. CUT FLUSH AND SLAB, CEILING OR WALL ABANDONED CONCEALED CONDUIT. SUITABLY PLUG CONDUITS.

KEY NOTES:

1. COORDINATE JUNTCION BOX AND RECEPTACLES LOCATION FOR POWER AND TELECOM CONNECTION WITH ARCHITECTURE PLAN AND DETAILS SHEETS NOT IN SCOPE
2. BOND #4/0 BARE COPPER TO BUILDING STRUCTURAL STEEL.
3. PROVIDE FLOOR BOX UNDERNEATH THE CONFERENCE ROOM TABLE
4. RELOCATE THE EXISTING IRRIGATION SYSTEM, IT'S ASSOCIATED DISCONNECT SWITCH AND FAN DISCONNECT SWITCH HERE. NOT IN SCOPE ??
5. RECEPTACLES ARE FED FROM EXISTING PANELBOARD TX-C. NOT IN SCOPE
6. FOR ROOMS 113,115 AND 128 REFER PANELBOARD LP-OL-1. FOR ROOMS 111,112, 116 TO 118 REFER PANEL BOARD LP-OL-2. NOT IN SCOPE
7. FOR ROOMS 119-127 AND 129 REFER PANEL BOARD LP-D.
8. POWER AND DATA OUTLETS FOR FUTURE CUBICLES.
9. ROUTE POWER AND DATA CONDUITS THROUGH THE POWER POLE FROM THE ISLAND TO THE CEILING. COORDINATE WITH THE ARCHITECTURAL PLAN FOR DETAILS NOT IN SCOPE
10. THE CUBICLE'S RECEPTACLES AND DATA OUTLETS ARE SUPPLIED BY THE VENDOR. THE CONTRACTOR IS RESPONSIBLE FOR ROUTING POWER CIRCUITS TO THE RECEPTACLES AND INSTALLING CONDUITS TO THE DATA OUTLETS. PLEASE REFER TO THE RISER DIAGRAM ON SHEET E-6 FOR DETAILED CONDUIT SIZE REQUIREMENTS FOR DATA OUTLETS.
11. CONTRACTOR SHALL PROVIDE CONDUIT FROM THE PATCH PANEL THROUGH CEILING AND WALLS TO THE DATA DROPS, CCTV DROPS AND ACCESS POINTS. DATA DROPS, CCTV DROPS AND ACCESS POINT LOCATIONS ARE SHOWN ON THIS SHEET. REFER TO THE RISER DIAGRAM ON SHEET E-6 FOR DETAILS ON THE CONDUIT SIZING. PATCH PANEL WILL BE PROVIDED AND INSTALLED BY OTHERS. COORDINATE THE LOCATION WITH OWNER. NOT IN SCOPE ??
12. CONDUITS FOR POWER AND DATA TO EACH CUBICLE WILL BE ROUTED THROUGH A POWER POLE FROM THE CUBICLES TO THE CEILING, AND FROM THE CEILING TO THE POWER SOURCE AND PATCH PANEL. FOR FUTURE CUBICLES, TERMINATE THE CONDUIT IN J-BOX IN THE CEILING ABOVE THE CUBICLES.
13. CONNECT TO EXISTING GROUND SYSTEM. CONTRACTOR TO FIELD VERIFY THE EXISTING GROUNDING SYSTEM LOCATION.
14. RELOCATE EXISTING FACP PANEL HERE. NOT IN SCOPE
15. WIRING FROM HVAC DDC CONTROLLER-1 TO VAVS WILL BE DONE BY HVAC CONTRACTOR.

FLOOR PLAN LEGEND

NOT IN SCOPE

PLAN

3/16" = 1'-0"

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
	Revisions			

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER — SEJAL KIRIT MEHTA — No. E 21688 — ELECTRICAL — STATE OF CALIFORNIA

6-4-25

CITY OF REDLANDS
Municipal Utilities and Engineering Department

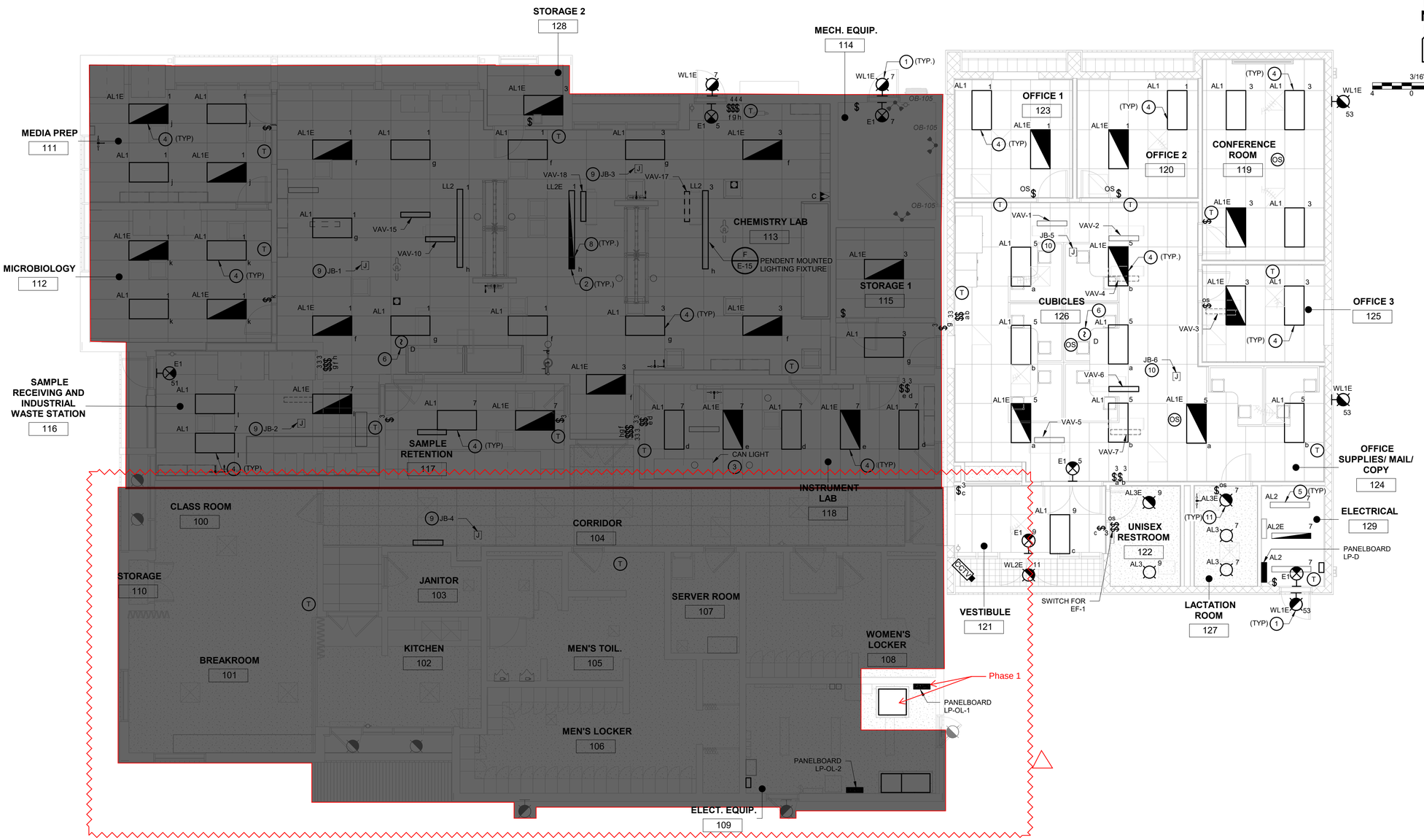
JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

ELECTRICAL POWER, DATA, COMMUNICATION, SECURITY & GROUNDING PLAN

Design by:	A. DINESH	REVIEWED BY:	6/11/2025
Date:	MAY 2025	Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200	DATE
Checked by:	M. SHERLY	APPROVED BY:	6/11/2025
Date:	MAY 2025	Goutam K. Dobey, City Engineer, RCE 75646	DATE
Drawn by:	V. VIDHU PRIYA	Sheet 117 of 126 Sheets	
Date:	MAY 2025	Scale Horiz. AS SHOWN	
Checked by:	M. SEJAL	Vert. AS SHOWN	E-7
Date:	MAY 2025		

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PLAN
3/16" = 1'-0"

GENERAL NOTES:

1. REFER TO SHEET E-6 FOR LIGHT FIXTURE SCHEDULE.
2. REFER TO SHEET E-11 FOR PANELBOARD SCHEDULES.
3. LOCATION OF LIGHT FIXTURES SHALL BE COORDINATED WITH HVAC CONTRACTOR TO AVOID ANY INTERFERENCE WITH HVAC OPENINGS.
4. ALL LIGHTING FIXTURES AND RECEPTACLES SHALL BE WIRED TO PANEL LP-D, LP-OL-1 AND LP-OL-2 UNLESS NOTED OTHERWISE.
5. EXIT SIGNS SHALL BE WIRED TO THE NORMAL LIGHTING CIRCUIT OF THE ROOM IT SERVES AND TO THE LINE SIDE OF THE LIGHTING SWITCH.
6. PRIOR TO CORING CONCRETE IN EXISTING BUILDING, SCAN SLAB OR WALL TO LOCATED REBAR AND/OR CONDUIT AND WIRING.
7. CUT FLUSH AND SLAB, CEILING OR WALL ABANDONED CONCEALED CONDUIT. SUITABLY PLUG CONDUITS.

KEY NOTES:

1. LIGHT FIXTURE 'WL1' AND 'WL1E' TO BE INSTALLED 1'-0" ABOVE THE NEW DOOR.
2. ~~PENDANT MOUNT LIGHT FIXTURE TYPE 'LL2' AND 'LL2E' LIGHTING FIXTURE AT 9'-0" A.F.F.~~ Not in scope
3. ~~CONTRACTOR SHALL COORDINATE CAN LIGHT LOCATION WITH ARCHITECTURE PLAN AND DETAILS SHEETS FOR CIRCUITING FROM PANELBOARD LP-OL-1.~~ Not in scope
4. RECESSED MOUNT LIGHT FIXTURE TYPE 'AL1' AND 'AL1E' AT 9'-0" A.F.F UNLESS NOTED OTHERWISE.
5. PENDANT MOUNT LIGHT FIXTURE TYPE 'AL2' AND 'AL2E' LIGHTING FIXTURE AT 9'-4" A.F.F.
6. HVAC CONTRACTOR SHALL PROVIDE AND INSTALL SMOKE DETECTOR. PROVIDE POWER TO SMOKE DETECTOR FROM LP-D 35.
7. ~~RELOCATED THE EXISTING LIGHT ABOVE THE NEW DOOR. REROUTE THE LIGHTING CONDUIT AND CIRCUIT TO THE NEW LOCATION OF THE LIGHT.~~ NOT IN SCOPE
8. ~~PROVIDE AN OPENING IN THE CEILING TILE AS LARGE AS THE FIXTURE BOD FOR INSTALLING THE LIGHT FIXTURE. THE CONTRACTOR SHALL COORDINATE WITH THE ARCHITECTURAL CONTRACTOR TO INSTALL THE LIGHT FIXTURE.~~ NOT IN SCOPE
9. ~~J-BOX TO BE USED TO POWER VAVS. REFER TO PANELBOARD LP-OL2 FOR DETAILS.~~ NOT IN SCOPE
10. J-BOX TO BE USED TO POWER VAVS. REFER TO PANELBOARD LP-D FOR DETAILS.
11. RECESSED MOUNT LIGHT FIXTURE TYPE 'AL3' AND 'AL3E' LIGHTING FIXTURE AT 9'-0".

REF. CLG. PLAN LEGEND

NOT IN SCOPE

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER — SEJAL KIRIT MEHTA — No. E 21688 — ELECTRICAL — STATE OF CALIFORNIA
6-4-25

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

ELECTRICAL LIGHTING AND CEILING POWER PLAN

WW-00007

BENCHMARK
CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM
ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	8/15	SM	SM

Revisions

Design by: A. DINESH
Date: MAY 2025
Checked by: M. SHERLY
Date: MAY 2025
Drawn by: V. VIDHU PRIYA
Date: MAY 2025
Checked by: M. SEJAL
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 118 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

E-8

Last Saved by: V. VIDHU PRIYA Time: 12-05-2025 19:11:19
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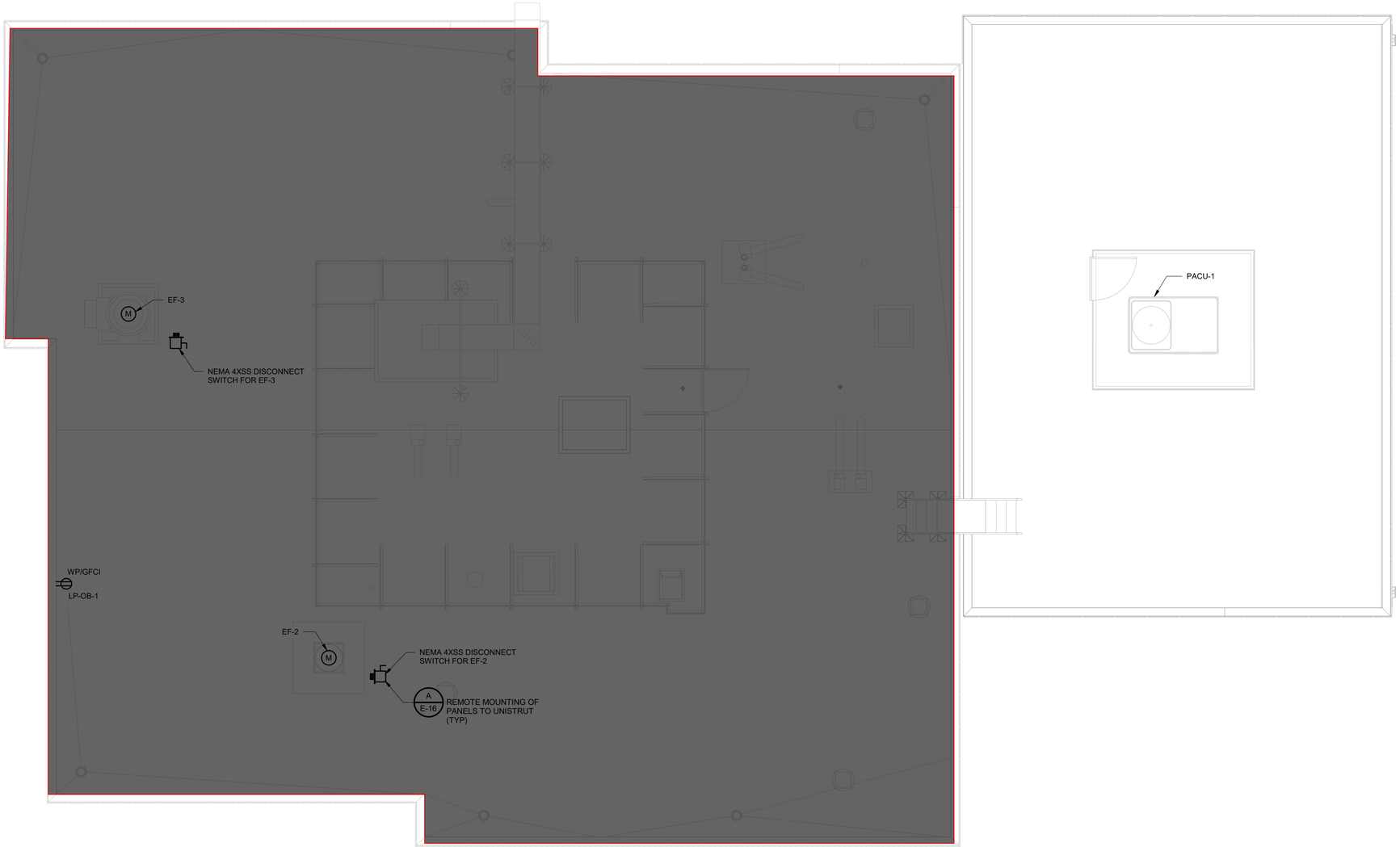
GENERAL NOTES:

1. EXPOSED CONDUITS ON THE ROOF TO BE TRIP HAZARD SAFE IF INSTALLED ACROSS THE PATHWAY.
2. REFER TO SHEET E-5 FOR ONELINE DIAGRAM AND SHEET E-11 FOR PANELBOARD SCHEDULE.

N

3/16" = 1'-0"

4 0 4 8



PLAN
3/16" = 1'-0"

ROOF PLAN LEGEND

NOT IN SCOPE

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER — SEJAL KIRIT MEHTA — No. E 21688 — ELECTRICAL — STATE OF CALIFORNIA

6-4-25

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT PROJECT No. 521028

ELECTRICAL ROOF POWER PLAN

Design by: A. DINESH
Date: MAY 2025
Checked by: M. SHERLY
Date: MAY 2025
Drawn by: V. VIDHU PRIYA
Date: MAY 2025
Checked by: M. SEJAL
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, RCE 75646 DATE

Sheet 119 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

E-9

WW-00007

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GENERAL NOTES:

1. EXISTING ELECTRICAL EQUIPMENT, FIXTURES AND BUILDING EQUIPMENT ARE BASED ON RECORD DRAWINGS AND FIELD OBSERVATIONS AND MAY NOT REFLECT CURRENT CONDITIONS.
2. ELECTRICAL DRAWINGS ARE INTENDED TO SHOW THE GENERAL LAYOUT OF WORK TO BE PERFORMED UNDER THIS CONTRACT WITHOUT ATTEMPTING TO SHOW ALL DETAILS. FURNISH LABOR, MATERIALS, EQUIPMENT AND INCIDENTALS REQUIRED FOR A COMPLETE AND OPERATIONAL ELECTRICAL SYSTEM AS SHOWN ON THE CONTRACT DOCUMENTS.
3. REFER TO SHEET E-5 FOR ONELINE DIAGRAM.
4. REFER TO SHEET E-11 FOR PANELBOARD SCHEDULES.

N

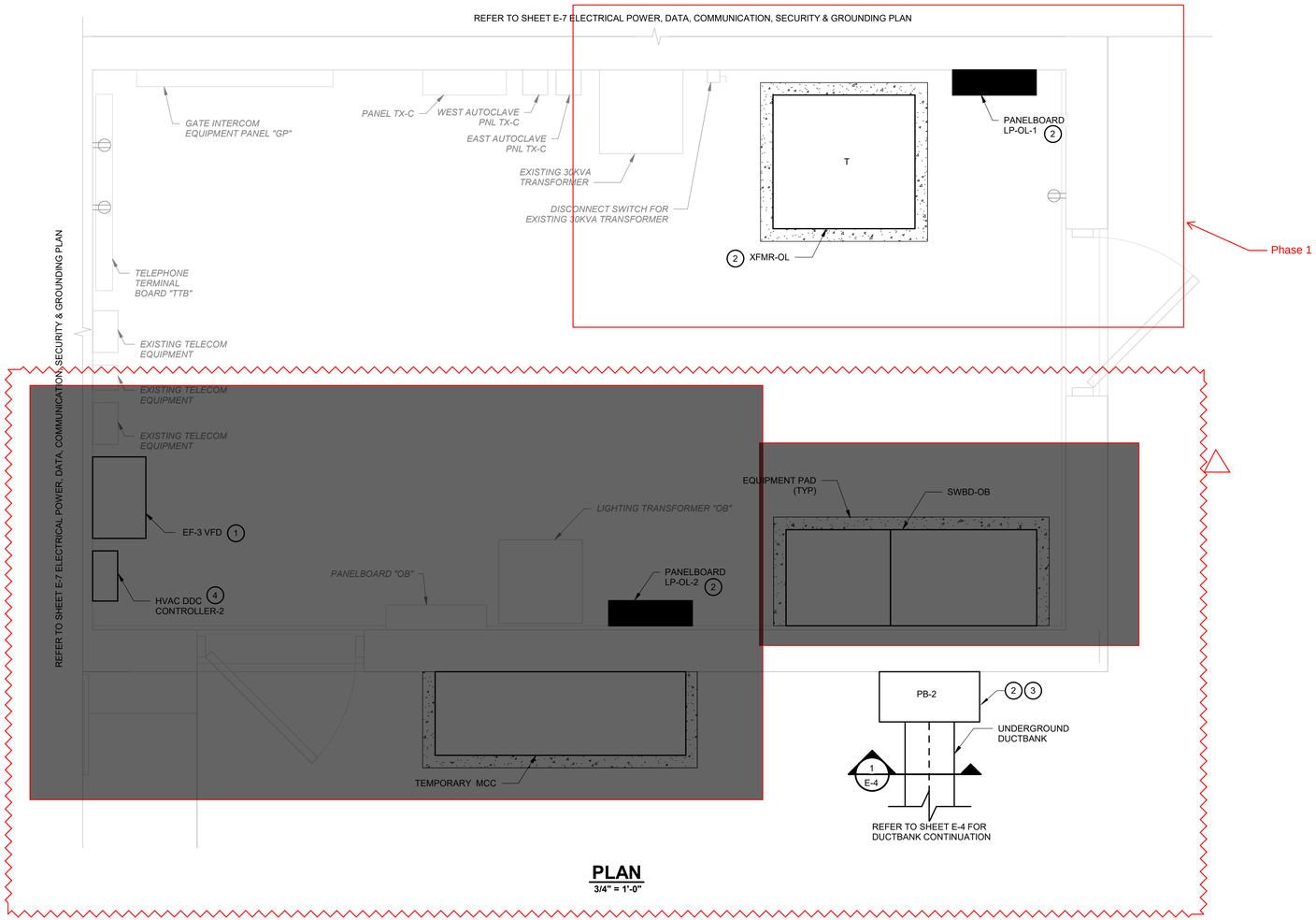
3/4" = 1'-0"

1 0 1 2

KEY NOTES:

1. ~~PROVIDED BY VENDOR, INSTALLED BY ELECTRICAL CONTRACTOR AND LOCATED IN ELECTRICAL ROOM.~~ Not in scope
2. LP-OL-1, LP-OL-2, XFMR-OL AND PB-2 TO BE INSTALLED ON PHASE 1.
3. PULLBOX SIZING SHALL COMPLY WITH NEC AND LOCAL CODE.
4. ~~WIRING FROM HVAC DDC CONTROLLER-2 TO VAVS WILL BE DONE BY HVAC CONTRACTOR.~~ Not in scope

NOT IN SCOPE



PLAN
3/4" = 1'-0"

CDM Smith
600 Wilshire Blvd
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER — SUNIL KIRTI MEHTA — No. E 21688 — ELECTRICAL — STATE OF CALIFORNIA

6-4-25

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION AND EXPANSION PROJECT
PROJECT No. 521028

ENLARGED ELECTRICAL ROOM PLAN / TEMPORARY POWER PLAN

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	8/15	SM	SM

Revisions

Design by: A. DINESH	REVIEWED BY: 6/11/2025
Date: MAY 2025	Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
Checked by: M. SHERLY	APPROVED BY: 6/11/2025
Date: MAY 2025	Goutam K. Dobey, City Engineer, RCE 75646 DATE
Drawn by: V. VIDHU PRIYA	Sheet 120 of 126 Sheets
Date: MAY 2025	Scale Horiz. AS SHOWN
Checked by: M. SEJAL	Vert. AS SHOWN
Date: MAY 2025	E-10

WW-00007

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PANELBOARD LP-OL-1

350 AMP MAIN BREAKER | **400** AMP BUS RATING | **54** POLES | **208/120** VOLTS | **3** PHASE | **4** WIRE | **60 Hz.**
10 KA SHORT CIRCUIT RATING | INTERNAL SPD : **NO**
LOCATION: **EXISTING ELECTRICAL RM.** | ENCLOSURE RATING: **NEMA 1 ,** | MOUNTING: **SURFACE**

CIRCUIT NO.	DESCRIPTION	LOAD KVA PHASE A	LOAD KVA PHASE B	LOAD KVA PHASE C	BREAKER AMPS/ POLES	NOTES	CIRCUIT NO.	DESCRIPTION	LOAD KVA PHASE A	LOAD KVA PHASE B	LOAD KVA PHASE C	BREAKER AMPS/ POLES	NOTES
1	LTG. CHEMISTRY LAB	0.54			20 /1	7	2	RECP. CHEMISTRY LAB	0.72			20 /1	7
3	LTG. CHEMISTRY LAB, STORAGE 1&2		0.42		20 /1	7	4	RECP. CHEMISTRY LAB & STORAGE 1		0.90		20 /1	7
5	LTG. & RECP. FUMEHOOD DIGESTER BLK			0.36	20 /1	7	6	RECP. CHEMISTRY LAB & STORAGE 2			0.54	20 /1	7
7	LTG. & RECP. FUMEHOOD DIGESTER BLK	0.36			20 /1	7	8	RECP. BOD STATION ISLANDS	1.40			20 /1	7
9	LTG. & RECP. FUMEHOOD EXTRACTION		1.56		20 /1	7	10	RECP. TURBIDITY STATION ISLANDS		1.40		20 /1	7
11	LTG. & RECP. FUMEHOOD EXTRACTION			1.06	20 /1	7	12	RECP. FOR REFRIGERATOR			1.00	20 /1	7
13	LTG. & RECP. VOLATILE ACID BALANCES	1.06			20 /1	7	14	RECP. SOLID STATION ISLANDS	1.40			20 /1	7
15	LTG. & RECP. VOLATILE ACID BALANCES		1.02		20 /1	7	16	RECP. FUTURE STATION ISLANDS		1.40		20 /1	7
17	LTG. &RECP. MOISTURE BALANCES			0.36	20 /1	7	18	RECP. CHEM. LAB REFRIGERATOR			0.36	20 /1	7
19	LTG. &RECP. MOISTURE BALANCES	0.36			20 /1	7	20	RECP. P/C	1.00			20 /1	7
21	LTG. CAN LIGHT		0.05		20 /1	7	22	RECP. FOR DISHWASHER CHEM. LAB		1.00		20 /1	7
23	SPARE				20 /1		24	RECP. FOR DISHWASHER CHEM. LAB			1.00	20 /1	7
25	FACP	0.25			20 /1	7,4	26	RECP. FOR REFRIGERATOR CHEM. LAB	0.20			20 /1	7
27	HOT WATER RECIR PUMP		1.92		20 /1	7	28	VAC PUMP		0.37		20 /1	7
29	SPRINKLER CONTROLLER			0.36	20 /1	7	30	BOD INCUBATORS			0.36	20 /1	7
31	PH ANALYZER	0.24			20 /1	7	32	BOD INCUBATORS	0.36			20 /1	7
33	PHONE BACK BOARD OUTLET		0.18		20 /1	7	34	HVAC DDC CONTROLLER-2		0.50		20 /1	7
35	JB-1 FOR VAV 8~10 & 15			5.00	60 /3	8	36	JB-2 FOR VAV 11, 12 & 14			2.33	25 /3	6
37		5.00					38		2.33				
39			5.00				40			2.33			
41	SPARE				20 /1		42	RECP. EXTERIOR			0.18	20 /1	7
43	PANEL OL-2	14.93			225 /3	5	44						
45			14.93				46	SPARE				20 /3	
47				14.93			48						
49	DISHWASHER	3.06			20 /2	9	50	SPARE				20 /1	
51			3.06				52	SPARE				20 /1	
53	SPACE				/1		54	SPARE				20 /1	
	TOTAL PHASE KVA THIS SIDE	25.80	28.14	22.07				TOTAL PHASE KVA THIS SIDE	7.41	7.90	5.77		
								TOTAL KVA PER PHASE	33.21	36.04	27.84		
								TOTAL THREE PHASE KVA		97.09			

NOTES:
1. PROVIDE LOCKING HARDWARE
3. 30 ma GFI CIRCUIT BREAKER FOR EQUIPMENT PROTECTION ONLY (HEAT TRACE)
5. BRANCH CIRCUIT WIRING: 2"C., 3#4/0, 1#4G
7. BRANCH CIRCUIT WIRING: 3/4"C., 2#12, 1#12G
9. BRANCH CIRCUIT WIRING: 3/4"C., 3#8, 1#10G

NOTES CONT.:
2. 5 ma GROUND FAULT INTERRUPTER (GFI) CIRCUIT BREAKER
4. PROVIDE LOCKING HARDWARE & PAINT BREAKER HANDLE RED (FACP)
6. BRANCH CIRCUIT WIRING: 3/4"C., 3#10, 1#10G
8. BRANCH CIRCUIT WIRING: 1"C., 3#6, 1#10G
10. BRANCH CIRCUIT WIRING: 3/4"C., 2#8, 1#10G

PANELBOARD LP-OL-2

225 AMP MAIN LUG ONLY | **225** AMP BUS RATING | **54** POLES | **208/120** VOLTS | **3** PHASE | **4** WIRE | **60 Hz.**
10 KA SHORT CIRCUIT RATING (2) | INTERNAL SPD : **NO**
LOCATION: **EXISTING ELECTRICAL ROOM** | ENCLOSURE RATING: **NEMA 1 ,** | MOUNTING: **SURFACE**

CIRCUIT NO.	DESCRIPTION	LOAD KVA PHASE A	LOAD KVA PHASE B	LOAD KVA PHASE C	BREAKER AMPS/ POLES	NOTES	CIRCUIT NO.	DESCRIPTION	LOAD KVA PHASE A	LOAD KVA PHASE B	LOAD KVA PHASE C	BREAKER AMPS/ POLES	NOTES
1	LTG. MEDIA PREP & MICROBIOLOGY	0.27			20 /1	7	2	RECP. DISTILLATOR	3.20			35 /1	10
3	LTG. SAMPLE RECEIVE & RETENTION		0.14		20 /1	7	4	RECP. SPORE HEATING & HOT PLATE		2.40		25 /1	8
5	LTG. INTRUMENT LAB			0.14	20 /1	7	6	RECP. FOR REFRIGERATOR			1.00	20 /1	7
7	LTG. OUTDOOR LIGHTS	0.07			20 /1	7	8	RECP. FOR REFRIGERATOR	1.00			20 /1	7
9	SPARE				20 /1		10	RECEPT. MEDIA PREP		0.18		20 /1	7
11	SPARE				20 /1		12	RECEPT. MICROBIOLOGY			0.36	20 /1	7
13	RECEPT. SAMPLE RETENTION	0.72			20 /1	7	14	RECP. TECTA	3.12			35 /1	10
15	SAMPLE RETENTION - REFRIGERATOR		0.20		20 /1	7	16	RECP. FLOUR., WTR. & QUANTI TRAY		2.29		25 /1	9
17	SAMPLE RETENTION - REFRIGERATOR			0.20	20 /1	7	18	RECP. INCUBATOR & COLONY COUNT.			2.08	25 /1	9
19	SAMPLE RETENTION - OVEN	0.20			20 /1	7	20	RECEPT. SAMPLE RECEIVING	0.54			20 /1	7
21	RECEPT. INSTRUMENT LAB		0.36		20 /1	7	22	RECP. FOR DISHWASHER		1.00		20 /1	7
23	RECP. FOR REFRIGERATOR			1.00	20 /1	7	24	RECP. SAMPLE RECEIVING- OVEN			0.46	20 /1	7
25	RECP. FOR REFRIGERATOR	1.00			20 /1	7	26	RECP. SAMPLE RECEIVING- OVEN	0.46			20 /1	7
27	RECP. PERCHLORATE & ULTRA. BATH		1.20		20 /1	7	28	RECP. CANOPY HOOD		1.20		20 /1	7
29	RECP. ANIONS			1.20	20 /1	7	30	SAMPLE RECEIVING - REFRIGERATOR			0.20	20 /1	7
31	RECP. TOC INS. &VORTEX	1.28			20 /1	7	32	SAMPLE RECEIVING - REFRIGERATOR	0.20			20 /1	7
33	EF-2		1.66		20 /1	7	34	SPARE				20 /1	
35	SPARE				20 /1		36	SPARE				20 /1	
37	SPARE				20 /1		38	SPARE				20 /1	
39	JB-3 FOR VAV 18 & 17		3.33		35 /3	5	40	JB-4 FOR VAV 13 & 16		1.83		20 /3	6
41		3.33		3.33			42		1.83		1.83		
43							44						
45	SPACE				/1		46	SPARE				20 /1	
47	SPACE				/1		48	SPARE				20 /1	
49	SPACE				/1		50	SPARE				20 /1	
51	SPACE				/1		52	SPARE				20 /1	
53	SPACE				/1		54	SPARE				20 /1	
	TOTAL PHASE KVA THIS SIDE	6.87	6.89	5.87				TOTAL PHASE KVA THIS SIDE	10.35	8.90	5.93		
								TOTAL KVA PER PHASE	17.22	15.79	11.80		
								TOTAL THREE PHASE KVA		44.81			

NOTES:
1. PROVIDE LOCKING HARDWARE
3. 30 ma GFI CIRCUIT BREAKER FOR EQUIPMENT PROTECTION ONLY (HEAT TRACE)
5. BRANCH CIRCUIT WIRING: 3/4"C., 3#8, 1#10G
7. BRANCH CIRCUIT WIRING: 3/4"C., 2#10, 1#10G
9. BRANCH CIRCUIT WIRING: 3/4"C., 2#10, 1#10G

NOTES CONT.:
2. 5 ma GROUND FAULT INTERRUPTER (GFI) CIRCUIT BREAKER
4. PROVIDE LOCKING HARDWARE & PAINT BREAKER HANDLE RED (FACP)
6. BRANCH CIRCUIT WIRING: 3/4"C., 3#12, 1#12G
8. BRANCH CIRCUIT WIRING: 3/4"C., 3#10, 1#10G
10. BRANCH CIRCUIT WIRING: 3/4"C., 2#8, 1#10G

GENERAL NOTES:

1. EXISTING LOADS ARE BASED ON THE EXISTING PANELBOARD SCHDULES INSIDE THE PANELBOARD DOOR.
2. PROVIDE A NEW TYPEWRITTEN PANELBOARD SCHEDULE FOR ALL PANELBOARD TO BE INSERTED INTO THE PLASTIC SLEEVE BEHIND THE PANELBOARD DOOR. COORDINATE NAMES WITH THE OWNER PRIOR TO PRINTING.
3. FIELD VERIFY EXISTING PANELBOARD CAPACITIES PRIOR TO ADDITION OF NEW LOADS TO THE PANELBOARDS IN ACCORDANCE WITH NEC ARTICLE 220.87. PROVIDE PEAK DEMAND MEASUREMENT TO THE ENGINEER FOR REVIEW PRIOR TO MODIFYING THE EXISTING PANELBOARD.

KEY NOTES:

(1) ~~PROVIDE NEW CIRCUIT BREAKER THAT MATCHES ALL ASPECTS OF THE EXISTING CIRCUIT BREAKERS, INCLUDING, BUT NOT LIMITED TO, MANUFACTURER, SHORT CIRCUIT RATING, ETC.~~ Not in scope

(2) ~~PROVIDE FEED THROUGH LUGS.~~ Not in scope

Phase 1

PANELBOARD LP- D

125 AMP MAIN BREAKER | **125** AMP BUS RATING | **42** POLES | **208/120** VOLTS | **3** PHASE | **4** WIRE | **60 Hz.**
10 KA SHORT CIRCUIT RATING | INTERNAL SPD : **NO**
LOCATION: **ELECTRICAL ROOM (NEW)** | ENCLOSURE RATING: **NEMA 1 ,** | MOUNTING: **SURFACE**

CIRCUIT NO.	DESCRIPTION	LOAD KVA PHASE A	LOAD KVA PHASE B	LOAD KVA PHASE C	BREAKER AMPS/ POLES	NOTES	CIRCUIT NO.	DESCRIPTION	LOAD KVA PHASE A	LOAD KVA PHASE B	LOAD KVA PHASE C	BREAKER AMPS/ POLES	NOTES
1	LTG. OFFICE 1 & OFFICE 2	0.13			20 /1	7	2	RECEPT. OFFICE 1 & OFFICE 2	1.08			20 /1	7
3	LTG. CONFERENCE ROOM & OFFICE 3		0.20		20 /1	7	4	RECEPT. CONFERENCE ROOM		0.72		20 /1	7
5	LTG. CUBICLES & OFFICE SUPPLIES			0.26	20 /1	7	6	RECEPT. CONFERENCE ROOM			0.54	20 /1	7
7	LTG. STORAGE & ELECTRICAL RM.	0.13			20 /1	7	8	RECEPT. OFFICE 3	0.54			20 /1	7
9	LTG. UNISEX RST. RM. & VESTIBULE		0.07		20 /1	7	10	RECEPT. CUBICLES WORKSTATION		0.72		20 /1	7
11	LTG. OUTDOOR			0.19	20 /1	7	12	RECEPT. CUBICLES WORKSTATION			0.72	20 /1	7
13	RECEPT. FRIDGE (LACTATION RM.)	0.20			20 /1	7	14	RECEPT. CUBICLES	0.72			20 /1	7
15	SPARE				20 /1		16	RECEPT. OFFICE SUPPLIES		0.90		20 /1	7
17	HVAC DDC CONTROLLER-1			0.50	20 /1	7	18	RECEPT. STORAGE & ELECTRICLA RM.			0.36	20 /1	7
19	EXHAUST FAN EF-1	0.06			20 /1	7	20	RECEPT. UNISEX RST. RM & VESTIBULE	0.36			20 /1	7
21	SPARE				20 /1		22	RECEPT. OFFICE PRINTER		0.18		20 /1	7
23	SPARE				20 /1		24	RECEPT. OUTDOOR			0.36	20 /1	7
25	JB-5 FOR VAV 1~4	3.00			35 /3	5	26	JB-6 FOR VAV 5~7	2.66			30 /3	6
27			3.00				28			2.66			
29				3.00			30				2.66		
31	SPARE				20 /1	7	32	FAA	0.03			20 /1	7
33	EWH-1		3.50		40 /1	8	34	SPARE				20 /1	
35	HVAC SMOKE DETECTORS			0.02	20 /1		36	SPARE				20 /1	
37	SPARE				20 /1		38	SPARE				20 /1	
39	SPARE				20 /1		40	SPARE				20 /1	
41	SPARE				20 /1		42	SPARE				20 /1	
	TOTAL PHASE KVA THIS SIDE	3.52	6.77	3.97				TOTAL PHASE KVA THIS SIDE	5.39	5.18	4.64		
								TOTAL KVA PER PHASE	8.91	11.95	8.61		
								TOTAL THREE PHASE KVA		29.47			

NOTES:
1. PROVIDE LOCKING HARDWARE
3. 30 ma GFI CIRCUIT BREAKER FOR EQUIPMENT PROTECTION ONLY (HEAT TRACE)
5. BRANCH CIRCUIT WIRING: 3/4"C., 3#8, 1#10G
7. BRANCH CIRCUIT WIRING: 3/4"C., 2#12, 1#12G

NOTES CONT.:
2. 5 ma GROUND FAULT INTERRUPTER (GFI) CIRCUIT BREAKER
4. PROVIDE LOCKING HARDWARE & PAINT BREAKER HANDLE RED (FACP)
6. BRANCH CIRCUIT WIRING: 3/4"C., 3#10, 1#10G
8. BRANCH CIRCUIT WIRING: 3/4"C., 2#6, 1#10G

EXISTING PANELBOARD LP-OB

175 AMP MAIN BREAKER | *225* AMP BUS RATING | *42* POLES | *120/240* VOLTS | *1* PHASE | *3* WIRE | *60 Hz.*
10 KA SHORT CIRCUIT RATING | INTERNAL SPD : *NO*
LOCATION: *ELECTRICAL RM.* | ENCLOSURE RATING: *NEMA 1 ,* | MOUNTING: *SURFACE*

CIRCUIT NO.	DESCRIPTION	LOAD KVA LINE 1	LOAD KVA LINE 2	BREAKER AMPS/ POLES	NOTES	CIRCUIT NO.	DESCRIPTION	LOAD KVA LINE 1	LOAD KVA LINE 2	BREAKER AMPS/ POLES	NOTES
1	RECEPT. - ROOF	0.18		20 /1	5	2	DEDICATED RECEPTACLE FOR	2.22		25 /2	6 (1)
3	EXIT LIGHTS			20 /1		4	FURNACE		2.22		
5	SPARE			20 /1		6	SPARE			20 /1	
7	LIGHTS - CONF. ROOM LUNCH/KITCHEN			20 /1		8	LIGHTS - BATHROOM + ELECT. ROOM			20 /1	
9	SPARE			20 /1		10	SPARE			20 /1	
11	SPARE			20 /1		12	SPARE			20 /1	
13	SPARE			20 /1		14	SPARE			20 /1	
15	SPARE			20 /1		16	PLUGS/HALLWAY/EAST BRK ROOM/LOBBY		0.90	20 /1	
17	PLUGS/OUTSIDE (EAST) LADIES + MENS BATHR	0.90		20 /1		18	PLUGS/BREAKROOM	0.54		20 /1	
19	PLUG/PHONE BACKBOARD		0.36	20 /1		20	REFRIGERATOR		0.80	20 /1	
21	KITCHEN/PLUG + DISPOSER	1.50		20 /1		22	COFFEE MAICER	0.18		20 /1	
23	PARKING LOT/EXTERIOR LIGHTS			20 /1		24	EXTERIOR LIGHTS + PARKING LOT			20 /1	
25	TO OM - 406 AT MCC "OM" FOR EF-1 & EF-2			20 /1		26	TO OM-407 AT MCC "OM" FOR EF-4			20 /1	
27	TO OM - 408 AT MCC "OM" FOR EF-3			20 /1		28	SPARE			20 /1	
29	MICROWAVE	0.80		20 /1		30	SPARE			20 /2	
31	BAC-TEE ROOM			30 /1		32					
33	SPARE			20 /1		34	SPARE			20 /1	
35	KITCHEN STOVE		4.80	50 /2		36	ICE MAKER		0.10	30 /1	
37		4.80				38	HONEYWELL EMS PANEL	0.50		20 /1	
39	DISHWASHER IN FURNACE ROOM		3.10	40 /2		40	SPARE			60 /2	
41		3.10				42					
	TOTAL LINE KVA THIS SIDE	11.28	8.26				TOTAL LINE KVA THIS SIDE	3.44	4.02		
							TOTAL KVA PER LINE	14.72	12.28		
							TOTAL KVA		27.00		

NOTES:
1. PROVIDE LOCKING HARDWARE
3. 30 ma GFI CIRCUIT BREAKER FOR EQUIPMENT PROTECTION ONLY (HEAT TRACE)
5. BRANCH CIRCUIT WIRING: 3/4"C., 2#12 , 1#12G
7.

NOTES CONT.:
2. 5 ma GROUND FAULT INTERRUPTER (GFI) CIRCUIT BREAKER
4. PROVIDE LOCKING HARDWARE & PAINT BREAKER HANDLE RED (FACP)
6. BRANCH CIRCUIT WIRING: 3/4"C., 2#10 , 1#10G
8.

EXISTING PANEL TX-C

100 AMP MAIN BREAKER | *100 AMP BUS RATING* | *20 POLES* | *208/120 VOLTS* | *3 PHASE* | *4 WIRE* | *60 Hz.*
22 KA SHORT CIRCUIT RATING | *INTERNAL SPD : NO*
LOCATION: ELECTRICAL ROOM (EXISTING) | *ENCLOSURE RATING: NEMA 1 ,* | *MOUNTING: SURFACE*

CIRCUIT NO.	DESCRIPTION	LOAD KVA PHASE A	LOAD KVA PHASE B	LOAD KVA PHASE C	BREAKER AMPS/ POLES	NOTES	CIRCUIT NO.	DESCRIPTION	LOAD KVA PHASE A	LOAD KVA PHASE B	LOAD KVA PHASE C	BREAKER AMPS/ POLES	NOTES
1		2.06					2	SPACE				/1	
3	LAB DISHWASHER		2.06		25 /3	6	4	EAST AUTOCLAVE		1.5		20 /2	7 (1)
5				2.06			6				1.5		
7	EXISTING LOAD				20 /1		8	SPARE				20 /1	
9	SPACE				/1		10	NW LAB HOOD		1.3		20 /1	
11	SPACE				/1		12	WEST AUTOCLAVE			1.5	20 /2	7 (1)
13	SPACE				/1		14		1.5				
15	SPACE				/1		16	MAIN DISCONNECT INTERRUPTOR PRIM.				100 /3	
17	SPACE				/1		18						
19	SPACE				/1		20						
	TOTAL PHASE KVA THIS SIDE	2.72	2.72	2.72				TOTAL PHASE KVA THIS SIDE	1.83	3.13	3.33		
								TOTAL KVA PER PHASE	4.55	5.85	6.05		
								TOTAL THREE PHASE KVA		16.45			

NOTES:
1. PROVIDE LOCKING HARDWARE
3. 30 ma GFI CIRCUIT BREAKER FOR EQUIPMENT PROTECTION ONLY (HEAT TRACE)
5. BRANCH CIRCUIT WIRING: 3/4"C., 3#12, 1#12G
7. BRANCH CIRCUIT WIRING: 3/4"C., 2#12, 1#12G

NOTES CONT.:
2. 5 ma GROUND FAULT INTERRUPTER (GFI) CIRCUIT BREAKER
4. PROVIDE LOCKING HARDWARE & PAINT BREAKER HANDLE RED (FACP)
6. BRANCH CIRCUIT WIRING: 3/4"C., 3#10, 1#10G
8.

CDM Smith
600 Wilshire Blvd #750
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER — SEJAL KIRIT MEHTA — No. E 21688 — ELECTRICAL — STATE OF CALIFORNIA
6-4-25

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R=13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	8/15	SM	SM

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT
PROJECT No. 521028

ELECTRICAL
PANELBOARD SCHEDULES

Designed by: A. DINESH — Date: MAY 2025
Checked by: M. SHERLY — Date: MAY 2025
Drawn by: V. VIDHU PRIYA — Date: MAY 2025
Checked by: M. SEJAL — Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, R.C.E. 75646 DATE

Sheet 121 of 126 Sheets
Scale Horiz. X
Vert. X

E-11

WW-00007

XREFs: [Redlands MUED Title Block - 24x36 (xRef)] Images: []
Last saved by: KUMARD Time: 13-05-2025 17:34:12
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STATE OF CALIFORNIA
Indoor Lighting
NRCC-LTI-E — CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name:	City of Redland water treatment plant laboratory upgrade	Report Page: (Page 1 of 7)
Project Address:	1950 Nevada St, Redlands, CA 92373	Date Prepared: 6/30/2025

This document is used to demonstrate compliance with requirements in §110.9, §110.12(c), §130.0, §130.1, §140.6 and §141.0(b)2 for indoor lighting scopes using the prescriptive path.

A. GENERAL INFORMATION

01	Project Location (city)		04	Total Conditioned Floor Area (ft²)	4,817
02	Climate Zone	10	05	Total Unconditioned Floor Area (ft²)	0
03	Occupancy Types Within Project (select all that apply):		06	# of Stories (Habitable Above Grade)	1

● Office

B. PROJECT SCOPE

This table includes any lighting systems that are within the scope of the permit application and are demonstrating compliance using the prescriptive path outlined in §140.6 or §141.0(b)2 for alterations.

Scope of Work	Conditioned Spaces		Unconditioned Spaces	
01	02	03	04	05
My Project Consists of (check all that apply):	Calculation Method	Area (ft²)	Calculation Method	Area (ft²)
☒ New Lighting System	Area Category Method	4817	Area Category Method	0
☐ New Lighting System - Parking Garage				
Total Area of Work (ft²)	4817		0	

C. COMPLIANCE RESULTS

If any cell on this table says "DOES NOT COMPLY" or "COMPLIES with Exceptional Conditions" refer to Table D. for guidance.

Lighting in conditioned and unconditioned spaces must not be combined for compliance per §140.6(b)1	Allowed Lighting Power per §140.6(b) (Watts)						Adjusted Lighting Power per §140.6(a) (Watts)					Compliance Results
	01	02	03	04		05		06	07		08	09
	Complete Building §140.6(c)1	Area Category §140.6(c)2	Area Category Additional §140.6(c)2G (+)	Tailored §140.6(c)3 (+)	=	**Total Allowed** (Watts)	≥	Total Designed (Watts)	Adjustments PAF Lighting Control Credits §140.6(a)2 (-)	=	**Total Adjusted** (Watts) *Includes Adjustments	**05 must be >= 08 §140.6**
	(See Table I)	(See Table I)	(See Table J)	(See Table K)				(See Table F)	(See Table P)			
Conditioned		2,890.2	0		=	2,890	≥	2,071	127	=	1944	COMPLIES
Unconditioned					=		≥			=		

Registration Number: — Registration Date/Time: — Registration Provider: Energysoft
CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance — Report Version: 2019.1.003, Schema Version: rev 20200601 — Report Generated: 2025-06-30 00:04:04

STATE OF CALIFORNIA
Indoor Lighting
NRCC-LTI-E — CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name:	City of Redland water treatment plant laboratory upgrade	Report Page: (Page 2 of 7)
Project Address:	1950 Nevada St, Redlands, CA 92373	Date Prepared: 6/30/2025

C. COMPLIANCE RESULTS

Controls Compliance (See Table H for Details)	COMPLIES
Rated Power Reduction Compliance (See Table Q for Details)	

D. EXCEPTIONAL CONDITIONS

This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.

E. ADDITIONAL REMARKS

This table includes remarks made by the permit applicant to the Authority Having Jurisdiction.

F. INDOOR LIGHTING FIXTURE SCHEDULE

This table includes all permanent designed lighting and all portable lighting in offices.

Designed Wattage: Conditioned Spaces

01	02	03	04	05	06	07	08	09	10	
Name or Item Tag	Complete Luminaire Description	Modular (Track) Fixture	Small Aperture & Color Change[1]	Watts per luminaire[2]	How is Wattage determined	Total Number of Luminaires	Excluded per §140.6(a)3	Design Watts	Field Inspector Pass	Fail
AL1	AL1	No	No	30.3	Mfr. Spec	50	No	1,515	☐	☐
AL2	AL2	No	No	23.8	Mfr. Spec	3	No	71.4	☐	☐
AL3	AL3	No	No	14.2	Mfr. Spec	5	No	71	☐	☐
LL2	LL2	No	No	138	Mfr. Spec	3	No	414	☐	☐
							Total Designed Watts: CONDITIONED SPACES	2,071		

[1] *FOOTNOTE: Design Watts for small aperture and color changing luminaires which qualify per §140.6(a)4B is adjusted to be 75% of their rated wattage. Table F automatically makes this adjustment, the permit applicant should enter full rated wattage in column 05.*

[2] *Authority Having Jurisdiction may ask for Luminaire cut sheets to confirm wattage used for compliance per §130.0(c) Wattage used must be the maximum rated for the luminaire, not the lamp.*

G. MODULAR LIGHTING SYSTEMS

This section does not apply to this project.

Registration Number: — Registration Date/Time: — Registration Provider: Energysoft
CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance — Report Version: 2019.1.003, Schema Version: rev 20200601 — Report Generated: 2025-06-30 00:04:04

STATE OF CALIFORNIA
Indoor Lighting
NRCC-LTI-E — CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name:	City of Redland water treatment plant laboratory upgrade	Report Page: (Page 3 of 7)
Project Address:	1950 Nevada St, Redlands, CA 92373	Date Prepared: 6/30/2025

H. INDOOR LIGHTING CONTROLS (Not including PAFs)

*This table includes lighting controls for conditioned and unconditioned spaces. When a control having a * is shown, the notes section of this table provides more detail on how compliance is achieved. The lighting controls section of the Compliance Summary Table on the first page will show "DOES NOT COMPLY" if the notes are left blank.*

Building Level Controls

01	02	03	
Mandatory Demand Response §110.12(c)	Shut-off controls §130.1(c)	Field Inspector Pass	Fail
Required > 10,000 SF	Whole Building Auto Time Switch	☐	☐

Area Level Controls

04	05	06	07	08	09	10	11	12	
Area Description	Complete Building or Area Category Primary Function Area	Area Controls §130.1(a)	Multi-Level Controls §130.1(b)	Shut-Off Controls §130.1(c)	Primary/Sky lit Daylighting §130.1(d)	Secondary Daylighting §140.6(d)	Interlocked Systems §140.6(a)1	Field Inspector Pass	Fail
*NOTES: Controls with a * require a note in the space below explaining how compliance is achieved. EX: Conference 1: Primary/Skylight Daylighting: Exempt because less than 120 watts of general lighting; EXCEPTION 1 to §130.1(d)2*							13 Plan Sheet Showing Daylit Zones:		

I. LIGHTING POWER ALLOWANCE: COMPLETE BUILDING OR AREA CATEGORY METHODS

Each area complying using the Complete Building or Area Category Methods per §140.6(b) are included in this table. Column 06 indicates if additional lighting power allowances per §140.6(c) or adjustments per §140.6(a) are being used .

Conditioned Spaces

01	02	03	04	05	06	
Area Description	Complete Building or Area Category Primary Function Area	Allowed Density (W/ft²)	Area (ft²)	Allowed Wattage (Watts)	Additional Allowance / Adjustment Area Category	PAF
LABORATORY	Office Open Plan	0.6	4,817	2,890.2	No	Yes
		TOTALS:	4,817	2,890.2	See Tables J, or P for detail	

Registration Number: — Registration Date/Time: — Registration Provider: Energysoft
CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance — Report Version: 2019.1.003, Schema Version: rev 20200601 — Report Generated: 2025-06-30 00:04:04

STATE OF CALIFORNIA
Indoor Lighting
NRCC-LTI-E — CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name:	City of Redland water treatment plant laboratory upgrade	Report Page: (Page 4 of 7)
Project Address:	1950 Nevada St, Redlands, CA 92373	Date Prepared: 6/30/2025

J. ADDITIONAL ALLOWANCE: AREA CATEGORY METHOD QUALIFYING LIGHTING SYSTEM

This section does not apply to this project.

K. TAILORED METHOD GENERAL LIGHTING POWER ALLOWANCE

This section does not apply to this project.

L. ADDITIONAL LIGHTING ALLOWANCE: TAILORED WALL DISPLAY

This section does not apply to this project.

M. ADDITIONAL LIGHTING ALLOWANCE: TAILORED FLOOR AND TASK LIGHTING

This section does not apply to this project.

N. ADDITIONAL LIGHTING ALLOWANCE: TAILORED ORNAMENTAL/SPECIAL EFFECTS

This section does not apply to this project.

O. ADDITIONAL LIGHTING ALLOWANCE: TAILORED VERY VALUABLE MERCHANDISE

This section does not apply to this project.

Registration Number: — Registration Date/Time: — Registration Provider: Energysoft
CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance — Report Version: 2019.1.003, Schema Version: rev 20200601 — Report Generated: 2025-06-30 00:04:04

STATE OF CALIFORNIA
Indoor Lighting
NRCC-LTI-E — CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name:	City of Redland water treatment plant laboratory upgrade	Report Page: (Page 5 of 7)
Project Address:	1950 Nevada St, Redlands, CA 92373	Date Prepared: 6/30/2025

P. POWER ADJUSTMENT: LIGHTING CONTROL CREDIT (POWER ADJUSTMENT FACTOR (PAF))

This table includes all areas indicated in Table I or Table K as using a PAF credit described in §140.6(a)2.

Conditioned Spaces

01	02								03	04	05	06	07
Area Description	PAF per §140.6(a)2 [1]								Luminaires Controlled for PAF Credit				Control Credit Power Adjustments (Watts)
	1	2A	2B	2C	3A	3B	4	5	6	7	Luminaire Name or Item Tag	Luminaire Design Watts	Number of Luminaires	Lighting Controlled (Watts)	
	Pick up to one				Pick up to one			Pick up to one							
LABORATORY	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	AL1	30.3	2	60.6	18.18
LABORATORY	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	AL1	30.3	2	60.6	18.18
LABORATORY	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	AL1	30.3	4	121.2	24.24
LABORATORY	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	AL1	30.3	2	60.6	18.18
LABORATORY	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	AL1	30.3	8	242.4	48.48
	08								09						
☐	All spaces applying PAF 5, 6 or 7 include a daylight design meeting requirements in §140.3(d). See Table S.								**Total Power Adjustment (Watts) CONDITIONED SPACES:**					127.26	

[1] *FOOTNOTES: PAFs outlined in Table 140.6-A include 1) Daylight dimming plus OFF; 2A) Occupant sensors in offices [dite/] 125 ft²; 2B) Occupant sensors in offices 126 - 250 ft²; 2C) Occupant sensors in offices 251 - 500 ft²; 3A) Institutional tuning, non-daylit areas and 3B) Institutional tuning, daylit areas; 4) Demand response; 5) Clerestory fenestration; 6) Horizontal slats; 7) Light shelves.*

Q. RATED POWER REDUCTION COMPLIANCE FOR ALTERATIONS

This section does not apply to this project.

R. 80% LIGHTING POWER FOR ALL ALTERATIONS - CONTROLS EXCEPTIONS

This section does not apply to this project.

Registration Number: — Registration Date/Time: — Registration Provider: Energysoft
CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance — Report Version: 2019.1.003, Schema Version: rev 20200601 — Report Generated: 2025-06-30 00:04:04

STATE OF CALIFORNIA
Indoor Lighting
NRCC-LTI-E — CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name:	City of Redland water treatment plant laboratory upgrade	Report Page: (Page 6 of 7)
Project Address:	1950 Nevada St, Redlands, CA 92373	Date Prepared: 6/30/2025

S. DAYLIGHT DESIGN POWER ADJUSTMENT FACTOR (PAF)

This table documents clerestories, horizontal slats or light shelves meet the requirements in §140.3(d) if a Power Adjustment Factor was claimed on Table P. These features must be documented on the architectural plans or where appropriate within the construction documents. This PAF also must be verified in the field with an acceptance test per Table U.

01	Compliance Strategy

T. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

Selections have been made based on information provided in this document. If any selection have been changed by permit applicant, an explanation should be included in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and can be found online at https://www.energy.ca.gov/title24/2019standards/2019_compliance_documents/Nonresidential_Documents/NRCI/

Form/Title	Field Inspector Pass	Fail
NRCI-LTI-01-E - Must be submitted for all buildings	☐	☐
NRCI-LTI-05-E- Must be submitted for a Power Adjustment Factor (PAF) to be recognized for compliance.	☐	☐

U. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

Selections have been made based on information provided in this document. If any selection have been changed by the permit applicant, an explanation should be included in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and any with "-A" in the form name must be completed through an Acceptance Test Technician Certification Provider (ATTCP). For more information visit: http://www.energy.ca.gov/title24/attcp/providers.html

Form/Title	Systems/Spaces To Be Field Verified		Field Inspector Pass	Fail
NRCA-LTI-02-A - Must be submitted for occupancy sensors and automatic time switch controls.	☐	☐		
NRCA-LTI-04-A - Must be submitted for demand responsive lighting controls.	☐	☐		

Registration Number: — Registration Date/Time: — Registration Provider: Energysoft
CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance — Report Version: 2019.1.003, Schema Version: rev 20200601 — Report Generated: 2025-06-30 00:04:04

STATE OF CALIFORNIA
Indoor Lighting
NRCC-LTI-E — CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name:	City of Redland water treatment plant laboratory upgrade	Report Page: (Page 7 of 7)
Project Address:	1950 Nevada St, Redlands, CA 92373	Date Prepared: 6/30/2025

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name:	Documentation Author Signature:
Company: CAMP DRESSER & McKEE	Signature Date:
Address:	CEA/ HERS Certification Identification (if applicable):
City/State/Zip:	Phone:

RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name: SEJAL KIRIT MEHTA	Responsible Designer Signature: Sejal Mehta
Company: CDM SMITH	Date Signed: 2025-06-30
Address:	License:
City/State/Zip: IRVINE CALIFORNIA	Phone:

Registration Number: — Registration Date/Time: — Registration Provider: Energysoft
CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance — Report Version: 2019.1.003, Schema Version: rev 20200601 — Report Generated: 2025-06-30 00:04:04

CDM Smith
600 Wilshire Blvd #750
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER — SEJAL KIRIT MEHTA — No. E 21688 — EXP. 12-31-26 — ELECTRICAL — STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT PROJECT No. 521028

ELECTRICAL
TITLE 24 CALCULATIONS AND FORMS SHEET 1

Designed by: A. DINESH — Date: MAY 2025
Checked by: M. SHERLY — Date: MAY 2025
Drawn by: V. VIDHU PRIYA — Date: MAY 2025
Checked by: M. SEJAL — Date: MAY 2025

REVIEWED BY: Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 — 6/11/2025 DATE
APPROVED BY: Goutam K. Dobey, City Engineer, R.C.E. 75646 — 6/11/2025 DATE

Sheet 122 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

E-12

WW-00007

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STATE OF CALIFORNIA
Outdoor Lighting
NRCC-LTO-E — CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE			NRCC-LTO-E
Project Name:	City of Redland water treatment plant laboratory upgrade	**Report Page:**	**(Page 1 of 6)**
Project Address:	1950 Nevada St, Redlands, CA 92373	**Date Prepared:**	6/30/2025

A. GENERAL INFORMATION

01	Project Location (city)	REDLAND	04	Total Illuminated Hardscape Area (ft²)	486
02	Climate Zone	10			
03	Outdoor Lighting Zone per Title 24 Part 1 §10.114 or as designated by Authority Having Jurisdiction (AHJ):				
☐	LZ-0: Very Low - Undeveloped Parkland	☐ LZ-2: Moderate - Rural Areas	☐	LZ-4: High - Must be reviewed by CA Energy Commission for Approval	
☐	LZ-1: Low - Developed Parkland	☒ LZ-3: Moderately High - Urban Areas			

B. PROJECT SCOPE
This table includes outdoor lighting systems that are within the scope of the permit application and are demonstrating compliance using the prescriptive path outlined in §140.7 or §141.0(b)2L for alterations.

My Project Consists of:

01		02		
☒	New Lighting System	Must Comply with Allowances from §140.7		
☐	Altered Lighting System	Is your alteration increasing the connected lighting load (Watts)?	○ Yes	○ No

03	04	05
% of Existing Luminaires Being Altered[1]	Sum Total of Luminaires Being Added or Altered	Calculation Method
☐ < 10% ☐ >= 10% and < 50% ☐ >= 50%		

Please proceed to Table F. Outdoor Lighting Fixture Schedule to define the project's luminaires.

[1] FOOTNOTES: % of Existing Luminaires Being Altered = (Sum Total of Luminaires Being Added or Altered / Existing Luminaires within the Scope of the Permit Application) x 100.

Registration Number: — Registration Date/Time: — Registration Provider: Energysoft

CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance — Report Version: 2019.1.003, Schema Version: rev 20200601 — Report Generated: 2025-06-29 23:58:27

STATE OF CALIFORNIA
Outdoor Lighting
NRCC-LTO-E — CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE			NRCC-LTO-E
Project Name:	City of Redland water treatment plant laboratory upgrade	**Report Page:**	**(Page 2 of 6)**
Project Address:	1950 Nevada St, Redlands, CA 92373	**Date Prepared:**	6/30/2025

C. COMPLIANCE RESULTS
Results in this table are automatically calculated from data input and calculations in Tables F through I. Note: If any cell on this table says "COMPLIES with Exceptional Conditions" refer to Table D. Exceptional Conditions for guidance or see applicable Table referenced below.

Calculations of Total Allowed Lighting Power (Watts) §140.7 or §141.0(b)2L											Compliance Results		
01		02		03		04		05		06	07	08	09
General Hardscape Allowance §140.7(d)1 (See Table I)	+	Per Application §140.7(d)2 (See Table J)	+	Sales Frontage §140.7(d)2 (See Table K)	+	Ornamental §140.7(d)2 (See Table L)	+	Per Specific Area §140.7(d)2 (See Table M)	OR	Existing Power Allowance §141.0(b)2L (See Table N)	= **Total Allowed** (Watts)	≥	**Total Actual** (Watts)	**07 must be >= 08**
362.15	+	---	+	---	+	---	+	---	OR	---	= 362.15	≥	140	COMPLIES
Cutoff Compliance (See Table G for Details)											N/A			
Controls Compliance (See Table H for Details)											COMPLIES			

D. EXCEPTIONAL CONDITIONS
This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.

E. ADDITIONAL REMARKS
This table includes remarks made by the permit applicant to the Authority Having Jurisdiction.

Registration Number: — Registration Date/Time: — Registration Provider: Energysoft

CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance — Report Version: 2019.1.003, Schema Version: rev 20200601 — Report Generated: 2025-06-29 23:58:27

STATE OF CALIFORNIA
Outdoor Lighting
NRCC-LTO-E — CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE			NRCC-LTO-E
Project Name:	City of Redland water treatment plant laboratory upgrade	**Report Page:**	**(Page 3 of 6)**
Project Address:	1950 Nevada St, Redlands, CA 92373	**Date Prepared:**	6/30/2025

F. OUTDOOR LIGHTING FIXTURE SCHEDULE
For new or altered lighting systems demonstrating compliance with §140.7 all new luminaires being installed and any existing luminaires remaining or being moved within the spaces covered by the permit application are included in the Table below. For altered lighting systems using the Existing Power method per §141.0(b)2L only new luminaires being installed and replacement luminaires being installed as part of the project scope are included (ie, existing luminaires remaining or existing luminaires being moved are not included).

Designed Wattage:

01	02		03	04	05	06	07	08	09	10	
Name or Item Tag	Complete Luminaire Description		Watts per luminaire[1,2]	How is Wattage determined	Total number luminaires[2]	Luminaire Status[3]	Excluded per §140.7(a)	Design Watts	Cutoff Req. > 6,200 initial lumen output §130.2(b)[4]	Field Inspector	
										Pass	Fail
WL1	WL1	☐ Linear	35	Mfr. Spec	4	New	☐	140	NA: < 6200 lumens	☐	☐
							Total Design Watts:	140			

* NOTES: Selections with a * require a note in the space below explaining how compliance is achieved.
EX: Luminaire is lighting a statue; EXCEPTION 2 to §130.2(b)

[1] FOOTNOTES: Authority Having Jurisdiction may ask for Luminaire cut sheets to confirm wattage used for compliance per §130.0(c)
[2] For linear luminaires, wattage should be indicated as W/lf instead of Watts/luminaire. Total linear feet should be indicated in column 05 instead of number of luminaires.
[3] Select "New" for new luminaires in a new outdoor lighting project, or for added luminaires in an alteration. Select "Altered" for replacement luminaires in an alteration. Select "Existing to Remain" for existing luminaires within the project scope that are not being altered and are remaining. Select "Existing Reinstalled" for existing luminaires which are being removed and reinstalled as part of the project scope.
[4] Compliance with mandatory cutoff requirements is required for luminaires with initial lumen output >= 6,200 unless exempted by §130.2(b)

G. CUTOFF REQUIREMENTS (BUG)
This section does not apply to this project.

Registration Number: — Registration Date/Time: — Registration Provider: Energysoft

CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance — Report Version: 2019.1.003, Schema Version: rev 20200601 — Report Generated: 2025-06-29 23:58:27

STATE OF CALIFORNIA
Outdoor Lighting
NRCC-LTO-E — CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE			NRCC-LTO-E
Project Name:	City of Redland water treatment plant laboratory upgrade	**Report Page:**	**(Page 4 of 6)**
Project Address:	1950 Nevada St, Redlands, CA 92373	**Date Prepared:**	6/30/2025

H. OUTDOOR LIGHTING CONTROLS
This table demonstrates compliance with controls requirements for all new or altered luminaires installed as part of the permit application. For alteration projects, luminaires which are existing to remain (ie untouched) and luminaires which are removed and reinstalled (wiring only) do not need to be included in this table even if they are within the spaces covered by the permit application.
*When an option having a * is selected, the notes section of this table must be completed. The lighting controls section of the Compliance Summary Table on the first page will show "DOES NOT COMPLY" if the notes are left blank.*

Mandatory Controls

01	02	03	04	05	
Area Description	Shut-Off §130.2(c)1	Auto-Schedule §130.2(c)2	Motion Sensor §130.2(c)3	Field Inspector	
				Pass	Fail

** NOTES: Controls with a * require a note in the space below explaining how compliance is achieved.*
EX: Not permitted by health & safety to be turned off; EXCEPTION 1 to §130.2(c)

I. LIGHTING POWER ALLOWANCE (per §140.7)
This table includes areas using allowance calculations per §140.7. General Hardscape Allowance is per Table 140.7-A while "Use it or lose it" Allowances are per Table 140.7-B . Indicate which allowances are being used to expand sections for user input. Luminaires that qualify for one of the "Use it or lose it" allowances shall not qualify for another "Use it or lose it" allowance.

	01				
	☒ General Hardscape Allowance Table I (below)	"Use it or lose it" Allowance (select all that apply) (select all that apply)			
		☐ Per Application Table J	☐ Sales Frontage Table K	☐ Ornamental Table L	☐ Per Specific Area Table M

Calculated General Hardscape Lighting Power Allowance per Table 140.7-A (LZ 0, 1 & 4)

Calculated General Hardscape Lighting Power Allowance per Table 140.7-A (LZ 2 & 3)

02	03	04	05	06	07	08	9	10
Area Description	Surface Type	Area Wattage Allowance (AWA)			Area Wattage Allowance (AWA)			Total General AWA + LWA (Watts)
		Illuminated Area (ft²)	Allowed Density (W/ft²)	Area Allowance (Watts)	Perimeter Length (lf)	Allowed Density (W/lf)	Linear Allowance (Watts)	
LAB EXTERIOR	Asphalt	486	0.025	12.2	0	0.2	0	12
							Initial Wattage Allowance for Entire Site (Watts):	350
							Total General Hardscape Allowance (Watts):	362

Registration Number: — Registration Date/Time: — Registration Provider: Energysoft

CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance — Report Version: 2019.1.003, Schema Version: rev 20200601 — Report Generated: 2025-06-29 23:58:27

STATE OF CALIFORNIA
Outdoor Lighting
NRCC-LTO-E — CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE			NRCC-LTO-E
Project Name:	City of Redland water treatment plant laboratory upgrade	**Report Page:**	**(Page 5 of 6)**
Project Address:	1950 Nevada St, Redlands, CA 92373	**Date Prepared:**	6/30/2025

J. LIGHTING ALLOWANCE: PER APPLICATION
This section does not apply to this project.

K. LIGHTING ALLOWANCE: SALES FRONTAGE
This section does not apply to this project.

L. LIGHTING ALLOWANCE: ORNAMENTAL
This section does not apply to this project.

M. LIGHTING ALLOWANCE: PER SPECIFIC AREA
This section does not apply to this project.

N. EXISTING CONDITIONS POWER ALLOWANCE (alterations only)
This section does not apply to this project.

O. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION
Selections have been made based on information provided in this document. If any selection have been changed by permit applicant, an explanation should be included in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and can be found online at https://www.energy.ca.gov/title24/2019standards/2019_compliance_documents/Nonresidential_Documents/NRCI/

Form/Title	Field Inspector	
	Pass	Fail
NRCI-LTO-01-E - Must be submitted for all buildings	☐	☐

P. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE
There are no NRCA forms required for this project.

Registration Number: — Registration Date/Time: — Registration Provider: Energysoft

CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance — Report Version: 2019.1.003, Schema Version: rev 20200601 — Report Generated: 2025-06-29 23:58:27

STATE OF CALIFORNIA
Outdoor Lighting
NRCC-LTO-E — CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE			NRCC-LTO-E
Project Name:	City of Redland water treatment plant laboratory upgrade	**Report Page:**	**(Page 6 of 6)**
Project Address:	1950 Nevada St, Redlands, CA 92373	**Date Prepared:**	6/30/2025

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT
I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name:	Documentation Author Signature:
Company: CAMP DRESSER & McKEE	Signature Date:
Address:	CEA/ HERS Certification Identification (if applicable):
City/State/Zip:	Phone:

RESPONSIBLE PERSON'S DECLARATION STATEMENT
I certify the following under penalty of perjury, under the laws of the State of California:
1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name:	Responsible Designer Signature:
SEJAL KIRIT MEHTA	Sejal Mehta
Company: CDMSMITH	Date Signed: 2025-06-30
Address:	License:
City/State/Zip: IRVINE CALIFORNIA	Phone:

Registration Number: — Registration Date/Time: — Registration Provider: Energysoft

CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance — Report Version: 2019.1.003, Schema Version: rev 20200601 — Report Generated: 2025-06-29 23:58:27

CDM Smith
600 Wilshire Blvd #750
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER — SEJAL KIRIT MEHTA — No. E 21688 — EXP. 12-31-26 — ELECTRICAL — STATE OF CALIFORNIA

5-14-2025

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R=13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT
PROJECT No. 521028
ELECTRICAL
TITLE 24 CALCULATIONS AND FORMS SHEET 2

Designed by: A. DINESH — Date: MAY 2025
Checked by: M. SHERLY — Date: MAY 2025
Drawn by: V. VIDHU PRIYA — Date: MAY 2025
Checked by: M. SEJAL — Date: MAY 2025

REVIEWED BY: Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 — 6/11/2025 — DATE
APPROVED BY: Goutam K. Dobey, City Engineer, R.C.E. 75646 — 6/11/2025 — DATE

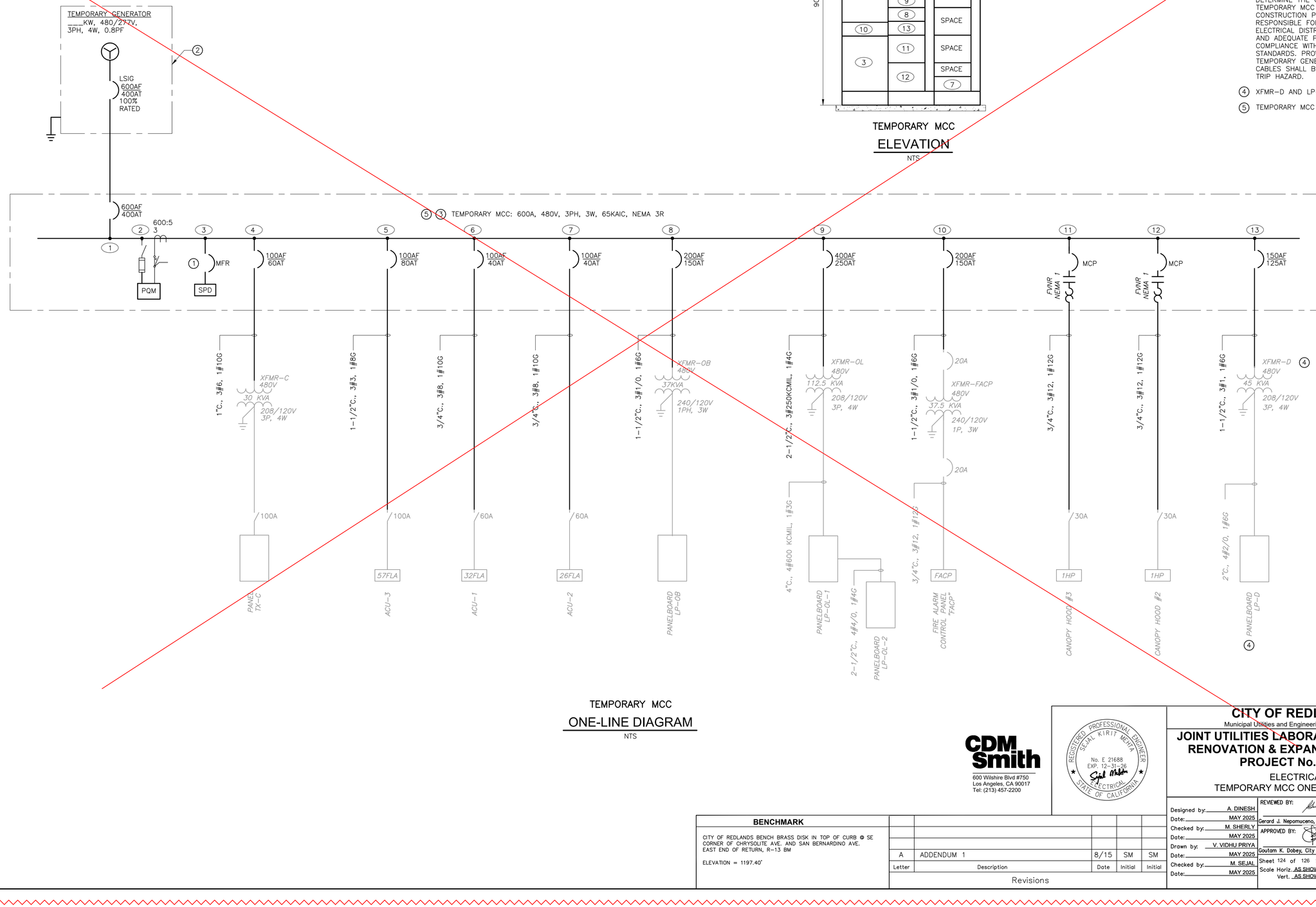
Sheet 123 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

E-13

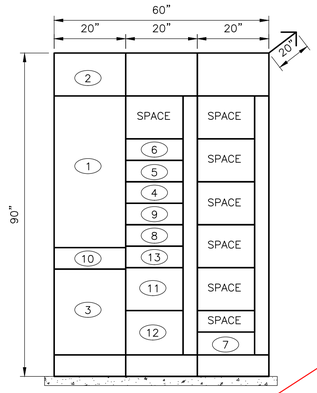
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NOT IN SCOPE- PHASE 2



TEMPORARY MCC
ONE-LINE DIAGRAM
NTS



TEMPORARY MCC
ELEVATION
NTS

GENERAL NOTES:

1. CONTRACTOR SHALL COORDINATE SEQUENCE OF DEMOLITION WITH THE OWNER PRIOR TO ANY AND ALL ELECTRICAL WORK ASSOCIATED WITH EXISTING EQUIPMENT AND SYSTEMS.

KEY NOTES:

1. BREAKER RATING DETERMINED BY MANUFACTURER.
2. TEMPORARY PORTABLE GENERATOR SHALL BE PROVIDED BY CONTRACTOR TO PROVIDE POWER TO TEMPORARY MCC. CONTRACTOR SHALL PROVIDE ALL PORTABLE GENERATOR CONNECTIONS AS REQUIRED.
3. THE CONTRACTOR SHALL SIZE THE TEMPORARY GENERATOR AND COORDINATE WITH THE OWNER TO DETERMINE THE OPTIMAL LOCATION FOR THE TEMPORARY MCC ON SITE DURING THE CONSTRUCTION PHASE. THE CONTRACTOR IS RESPONSIBLE FOR ENGINEERING THE TEMPORARY ELECTRICAL DISTRIBUTION SYSTEM, ENSURING SAFE AND ADEQUATE POWER SUPPLY TO ALL LOADS, IN COMPLIANCE WITH SITE REQUIREMENTS AND SAFETY STANDARDS. PROVIDE TEMPORARY CABLES FROM TEMPORARY GENERATOR TO LOADS. TEMPORARY CABLES SHALL BE SECURED TO WALL TO AVOID ANY TRIP HAZARD.
4. XFMR-D AND LP-D WILL BE INSTALL ON PHASE 1.
5. TEMPORARY MCC WILL BE PROVIDE AT PHASE 2A.

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R-13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial
A	ADDENDUM 1	8/15	SM	SM

Revisions

CDM Smith
600 Wilshire Blvd #750
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER
SEJAL KIRIT MEHTA
No. E 21688
EXP. 12-31-26
ELECTRICAL
STATE OF CALIFORNIA

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT
PROJECT No. 521028

ELECTRICAL
TEMPORARY MCC ONELINE DIAGRAM

Designed by: A. DINESH
Date: MAY 2025
Checked by: M. SHERLY
Date: MAY 2025
Drawn by: V. VIDHU PRIYA
Date: MAY 2025
Checked by: M. SEJAL
Date: MAY 2025

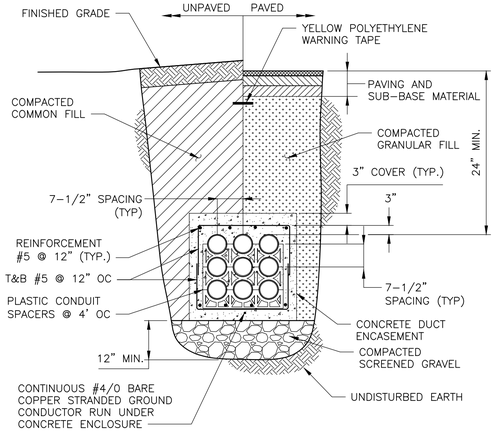
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, R.C.E. 75646 DATE

Sheet 124 of 126 Sheets
Scale Horiz. AS SHOWN
Vert. AS SHOWN

E-14

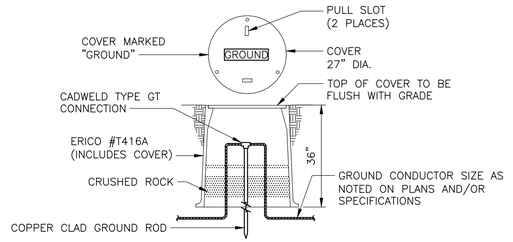
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UNDERGROUND POWER DUCT BANK

DETAIL A
NTS

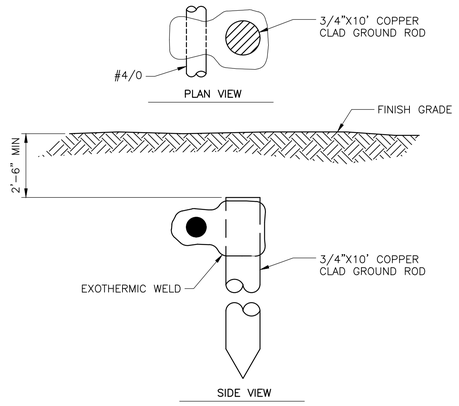


NOTE:

1. TO IMPROVE SYSTEM RESISTANCE, ERICO GEM MAY BE USED AS A BACKFILL MATERIAL IN AN AUGERED HOLE

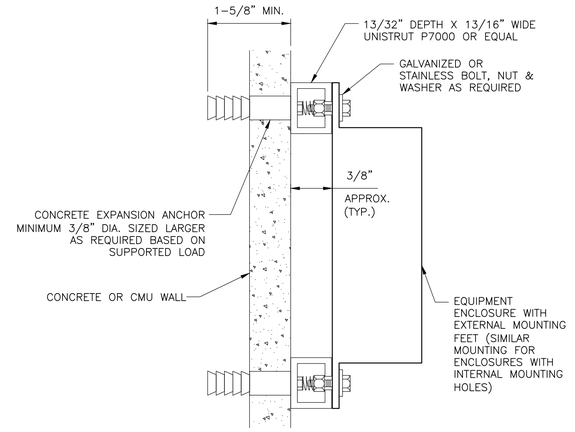
GROUND ROD TEST WELL

DETAIL B
NTS



GROUND GRID CONNECTION TO GROUND ROD

DETAIL C
NTS

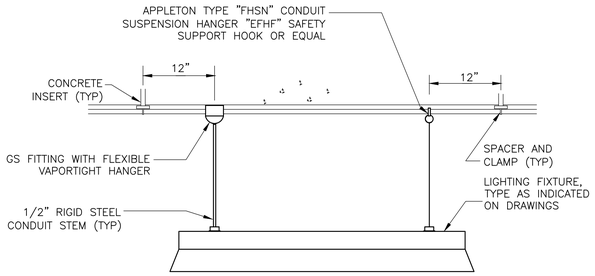


EQUIPMENT ENCLOSURE MOUNTED ON CONCRETE OR CMU WALL

DETAIL D
NTS

CONDUIT THROUGH SLAB

DETAIL E
NTS



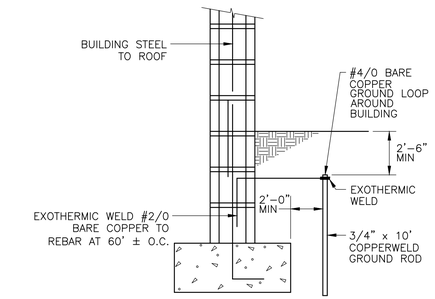
PENDANT MOUNTED LIGHTING FIXTURE

DETAIL F
NTS

ITEM NUMBER	QUANTITY	DESCRIPTION	MANUFACTURER	CAT #
1	1	CADWELD CABLE TO ROD	CADWELD	TYPE GT
2	1	GROUND ROD, COPPER CLAD, 8 FT MIN.	ERITECH	
3	1	CADWELD CABLE TO ROD	CADWELD	TYPE GS

GROUND ROD INSTALLATIONS PER NEC 250-83(c) (3)

DETAIL G
N.T.S.



BUILDING STRUCTURE BONDING

DETAIL H
NTS

CDM Smith
600 Wilshire Blvd #750
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER
SEJAL KIRIT MEHTA
No. E 21688
ELECTRICAL
STATE OF CALIFORNIA

6-4-25

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R=13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT
PROJECT No. 521028

ELECTRICAL DETAILS 1

Designed by: A. DINESH
Date: MAY 2025
Checked by: M. SHERLY
Date: MAY 2025
Drawn by: V. VIDHU PRIYA
Date: MAY 2025
Checked by: M. SEJAL
Date: MAY 2025

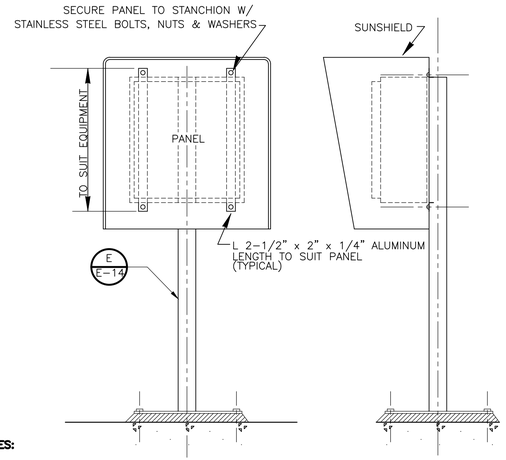
REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE
APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, R.C.E. 75646 DATE

Sheet 125 of 126 Sheets
Scale Horiz. X
Vert. X

E-15

WW-00007

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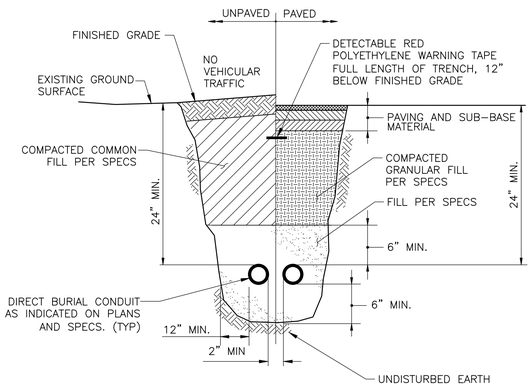


NOTES:

1. **ALL EXPOSED EDGES TO BE GROUND SMOOTH AND BURR FREE.**
2. **PAINT ALL ALUMINUM IN CONTACT WITH CONCRETE ACCORDING TO SPECIFICATIONS FOR PAINTING.**
3. **REFER TO SPECIFICATIONS FOR MATERIAL TYPES.**
4. **SUBMIT STRUCTURAL CALCULATIONS FOR EQUIPMENT SUPPORT STRUCTURE DESIGNED BY CONTRACTOR.**
5. **SUNSHIELD REQUIRED FOR OUTDOOR INSTALLATIONS ONLY.**

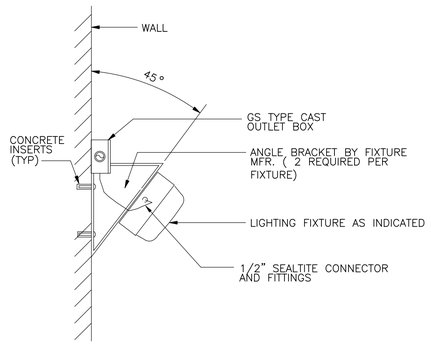
REMOTE MOUNTING OF PANELS TO UNISTRUT

DETAIL A — NTS



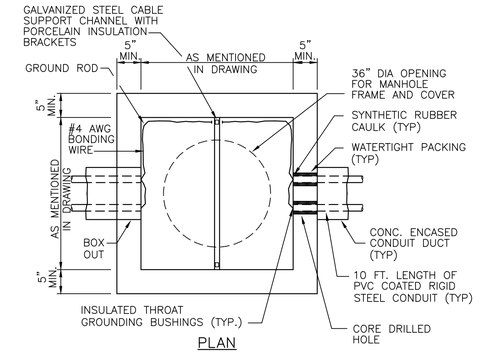
DIRECT BURIED CONDUIT

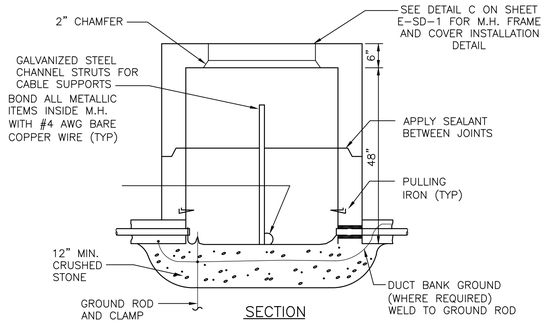
DETAIL B — NTS



WALL MOUNT LIGHTING FIXTURE

DETAIL C — NTS



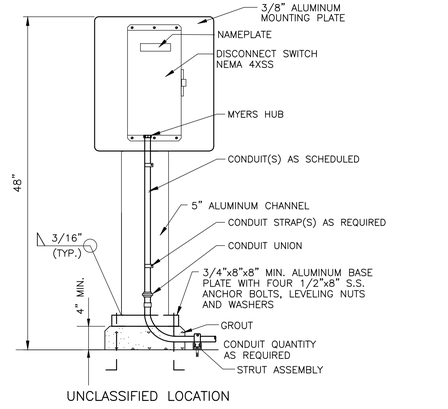


NOTES:

1. BOND ALL METALLIC ITEMS INSIDE EHH TO GROUND W/MIN. #4 AWG BARE COPPER CABLE UNO.
2. HANDHOLES SHALL BE REINFORCED FOR H20 WHEEL LOAD.
3. CABLES SHALL BE RACKED ON PORCELAIN INSULATION CLAMPS.

ELECTRICAL HANDHOLE (EHH)

DETAIL D — NTS

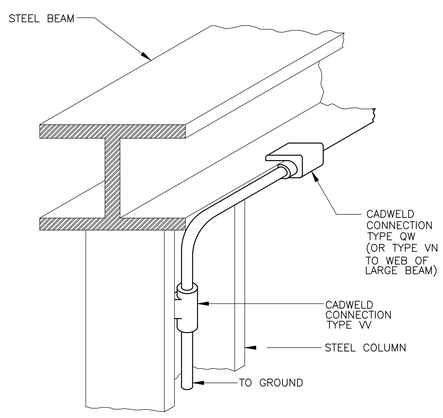


UNCLASSIFIED LOCATION

NOTES:
1. PROVIDE DISCONNECT WITH AUXILIARY CONTACT.
2. PUSHBUTTONS AS REQUIRED.
3. CONTRACTOR TO DESIGN MOUNTING STAND. MINIMUM DIMENSIONS ARE SHOWN.
4. SUBMITTALS SHALL BE IN ACCORDANCE WITH SPECIFICATIONS.

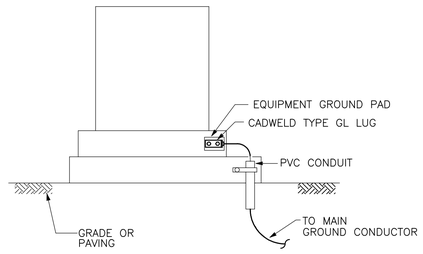
MOUNTING STAND

DETAIL E — NTS



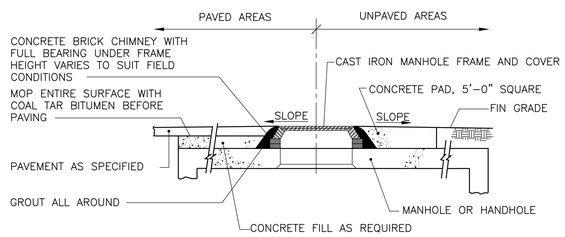
BUILDING STEEL GROUND

DETAIL F — N.T.S.



PAD MOUNTED EQUIPMENT GROUND

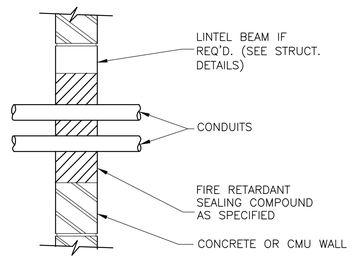
DETAIL G — N.T.S.



NOTE:
FINAL GRADING SHALL PROVIDE ADEQUATE DRAINAGE AWAY FROM MANHOLE COVER IN ALL DIRECTIONS

HANDHOLE FRAME AND COVER

DETAIL H — NTS



TYPICAL ABOVE GRADE WALL NO WATERTIGHT CONDUIT PENETRATION

DETAIL I — NTS

CDM Smith
600 Wilshire Blvd #750
Los Angeles, CA 90017
Tel: (213) 457-2200

REGISTERED PROFESSIONAL ENGINEER — SEJAL KIRIT MEHTA — No. E 21688 — ELECTRICAL — STATE OF CALIFORNIA

6-4-25

BENCHMARK

CITY OF REDLANDS BENCH BRASS DISK IN TOP OF CURB @ SE CORNER OF CHRYSOLITE AVE. AND SAN BERNARDINO AVE. EAST END OF RETURN, R=13 BM

ELEVATION = 1197.40'

Letter	Description	Date	Initial	Initial

Revisions

CITY OF REDLANDS
Municipal Utilities and Engineering Department

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT
PROJECT No. 521028

ELECTRICAL DETAILS 2

Designed by: A. DINESH
Date: MAY 2025
Checked by: M. SHERLY
Date: MAY 2025
Drawn by: V. VIDHU PRIYA
Date: MAY 2025
Checked by: M. SEJAL
Date: MAY 2025

REVIEWED BY: 6/11/2025
Gerard J. Nepomuceno, Civil Engineer, R.C.E. 93200 DATE

APPROVED BY: 6/11/2025
Goutam K. Dobey, City Engineer, R.C.E. 75646 DATE

Sheet 126 of 126 Sheets
Scale Horiz. X
Vert. X

E-16

WW-00007

XREFs: [Redlands MLIED Title Block - 24x36 (xRef)] Images: []
Last saved by: KUMARD Time: 13-05-2025 17:11:20
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5/13/2025 5:11 PM

CITY OF REDLANDS
MUNICIPAL UTILITIES &
ENGINEERING DEPARTMENT

Bid Proposal, Contract Documents and Specifications

For

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT
PROJECT No. 521028

PHASE 1

REGISTERED PROFESSIONAL ENGINEER
BRIAN JOHN LETO
C 80821
CIVIL
STATE OF CALIFORNIA

6/11/2025

RECYCLED PAPER

JUNE 2025

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DOCUMENT 00107 - SEALS PAGE

1.1 DESIGN PROFESSIONALS OF RECORD

A. Engineer:

1. Brian Leto
2. License #C 80821.
3. Responsible for Division 00-01.



6-11-2025

B. Civil Engineer:

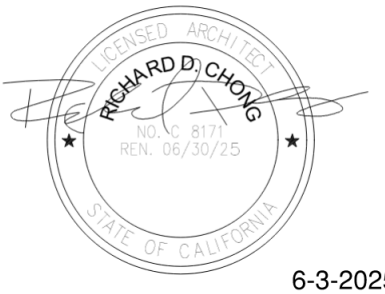
1. Michelle Ma
2. License #C 70319.
3. Responsible for Division 31-33



6-9-2025

C. Architect:

1. Richard Chong
2. License #C 8171.
3. Responsible for 024119, 042200, Divisions 06-12



6-3-2025

D. Structural Engineer:

1. Alan Hahn.
2. License #C 82421
3. Responsible for 018829, 018839, Division 03, Division 05.



6-9-2025

E. Fire-Protection Engineer:

1. Patrick Veldenian.
2. License # FP1968.
3. Responsible for Division 21, 284621.13



6-9-2025

F. Mechanical Engineer:

1. Said Ibrahim.
2. License # M39357.
3. Responsible for Division 22-23.



6-9-2025

G. Electrical Engineer:

1. Sejal Mehta.
2. License # E21688.
3. Responsible for Division 26.



6-4-2025

END OF DOCUMENT 000107

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CITY OF REDLANDS

MUNICIPAL UTILITIES & ENGINEERING DEPARTMENT

Bid Proposal, Contract Documents and Specifications

for

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT PROJECT No. 521028

For use in conjunction with specifications entitled: "Standard Specifications for Public Works Construction (Greenbook)" 2021 Edition; "Standard Plans for Public Works Construction" 2021 Edition; Municipal Utilities and Engineering Department's Water Systems Standard Specifications and Sanitary Sewer System Standard Specifications, latest editions; and General Permit Conditions and Trench Specifications.

City Council:
Mario Saucedo, Mayor
Marc Shaw, Mayor Pro Tem
Paul T. Barich, Mayor Pro Tem
Eddie Tejeda, Mayor
Denise Davis, Councilmember

City Clerk:
Jeanne Donaldson, City Clerk

City Staff:
Charles M. Duggan Jr., City Manager

JUNE 2025

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JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT

PROJECT No. 521028

TABLE OF CONTENTS

(XX) REFLECTS PAGE IDENTIFICATION FOOTER ABBREVIATION

NOTICE INVITING SEALED PROPOSALS (NIB)

BID DOCUMENTS (BD)

INSTRUCTIONS TO BIDDERS 1
PROPOSAL 10
BID CERTIFICATION 19
BID BOND 20
NON-COLLUSION AFFIDAVIT 21
STATEMENT BY BIDDER 22
OFFICERS OF CORPORATION (Members of Firm) 22
SUB-CONTRACTORS LIST 23
QUALIFICATION AND EXPERIENCE STATEMENT 24
GENERAL INFORMATION 25

CONTRACT DOCUMENTS (CD)

PUBLIC WORKS CONSTRUCTION CONTRACT 2

GENERAL CONDITIONS (GC)

SECTION 1 – GENERAL, TERMS, DEFINITIONS, ABBREVIATIONS, UNITS OF MEASURE, AND SYMBOLS 1
SECTION 2 - SCOPE OF THE WORK 2
SECTION 3 - CONTROL OF THE WORK 3
SECTION 4 - CONTROL OF MATERIALS 7
SECTION 5 – LEGAL RELATIONS AND RESPONSIBILITES 8
SECTION 6 – PROSECUTION AND PROGRESS OF THE WORK 30
SECTION 7 - MEASUREMENT AND PAYMENT 32
SECTION 8 - FACILITIES FOR AGENCY PERSONNEL 33
SECTION 9 - ASSIGNMENT OF UNFAIR BUSINESS PRACTICES CLAIMS 33
SECTION 10 - TRENCHING AND EXCAVATION 33
SECTION 11 - REMOVAL, RELOCATION OR PROTECTION OF EXISTING UTILITIES 34
SECTION 200 - ROCK MATERIALS 35
SECTION 201 - CONCRETE, MORTAR AND RELATED MATERIALS 36

SECTION 203 - BITUMINOUS MATERIALS 36
SECTION 206 - MISCELLANEOUS METAL ITEMS 37
SECTION 207 – GRAVITY PIPE 38
SECTION 211 - MATERIAL TESTS 38
SECTION 214 - TRAFFIC STRIPING, CURB AND PAVEMENT MARKINGS, AND PAVEMENT MARKERS 38
SECTION 300 - EARTHWORK 39
SECTION 301 - TREATED SOIL, SUBGRADE PREPARATION AND PLACEMENT OF BASE MATERIALS 43
SECTION 302 - ROADWAY SURFACING 48
SECTION 303 - CONCRETE AND MASONRY CONSTRUCTION 58
SECTION 304 - METAL FABRICATION AND CONSTRUCTION 61
SECTION 314 - TRAFFIC STRIPING, CURB AND PAVEMENT MARKINGS, AND PAVEMENT MARKERS 62

GENERAL REQUIREMENTS

SECTION 01110 COORDINATION OF WORK
SECTION 01112 DESCRIPTION OF WORK
SECTION 01200 MEASUREMENT AND PAYMENT
SECTION 01251 CHANGE ORDER REQUESTS
SECTION 01254 CHANGE ORDERS
SECTION 01298 SCHEDULE OF VALUES
SECTION 01321 CONSTRUCTION SCHEDULE
SECTION 01322 CONSTRUCTION PROGRESS PHOTOGRAPHY
SECTION 01323 CONSTRUCTION STATUS REPORTS
SECTION 01330 SUBMITTALS
SECTION 01572 EROSION CONTROL PLAN
SECTION 01581 CONSTRUCTION INFORMATION SIGNS
SECTION 01721 MOBILIZATION
SECTION 01722 SURVEYING
SECTION 01732 POTHOLING
SECTION 01740 DEMOBILIZATION

TECHNICAL SPECIFICATIONS

SECTION 02222 PROTECTING EXISTING UNDERGROUND UTILITIES
SECTION 09900 PAINTING AND COATING
SECTION 15050 GENERAL PIPING REQUIREMENTS
SECTION 15100 MANUAL, CHECK AND PROCESS VALVES

SECTION 15108 AIR RELEASE AND VACUUM-RELIEF VALVES
SECTION 15122 PIPE COUPLINGS
SECTION 15123 CORPORATION STOPS AND SERVICE SADDLES
SECTION 15141 DISINFECTION OF PIPING
SECTION 15144 PRESSURE TESTING AND PIPING
SECTION 15240 DUCTILE-IRON PIPE
SECTION 15250 CEMENT-MORTAR LINED AND COATED STEEL PIPE AND SPECIALS

APPENDIX

APPENDIX A CHECKLIST OF LABOR LAW REQUIREMENTS
APPENDIX B CITY OF REDLANDS WORKDAY CONSTRUCTION SCHEDULE
APPENDIX C PERMITS
APPENDIX D CITY OF REDLANDS CONTRACTOR SAFETY PROGRAM

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Additional Technical Specifications

Additional Technical Specifications	
Division 01	
018829	Seismic Performance Requirements
018839	Wind Performance Requirements
Division 02	
024119	Selective Demolition
Division 03	
030130.71	Modifications to Existing Concrete
033010	Miscellaneous Cast-in-Place Concrete
036000	Grouting
Division 04	
042200	Concrete Unit Masonry
Division 05	
050519	Post-Installed Anchors and Reinforcing Bars
052100	Steel Joist Framing
053100	Steel Decking
054000	Cold-Formed Metal Framing
055000	Metal Fabrications
Division 06	
061000	Rough Carpentry
Division 07	
070150.19	Preparation for Reroofing
071900	Water Repellents
072100	Thermal Insulation
072600	Vapor Retarders
~~074213.23~~	~~Metal Composite Material Wall Panels~~
075419	Polyvinyl-Chloride (PVC) Roofing
076200	Sheet Metal Flashing and Trim
077100	Roof Specialties
077129	Manufactured Roof Expansion Joints
077200	Roof Accessories
079100	Performed Joint Seals
079200	Joint Sealants
079513.13	Interior Expansion Joint Cover Assemblies

Division 08	
081113	Hollow Metal Doors and Frames
081416	Flush Wood Doors
084113	Aluminum-Framed Entrances and Storefronts
085113	Aluminum Windows
087100	Door Hardware
088000	Glazing
089119	Fixed Louvers
Division 09	
092216	Non-Structural Metal Framing
092900	Gypsum Board
093013	Ceramic Tiling
095123	Acoustical Tile Ceilings
096513	Resilient Base and Accessories
096519	Resilient Tile Flooring
~~096723~~	~~Resinous Flooring~~
099113	Exterior Painting
099123	Interior Painting
Division 10	
101423.16	Room-Identification Panel Signage
102800	Toilet, Bath, and Laundry Accessories
104413	Fire Protection Cabinets
104416	Fire Extinguisher
Division 11	
~~115300~~	~~Laboratory Equipment~~
Division 12	
123553.13	Metal Laboratory Casework
123661.16	Solid Surface Countertops
Division 21	
210517	Sleeves and Sleeve Seals for Fire-Suppression Piping
210518	Escrutcheons for Fire-Suppression Piping
210529	Hangers and Supports for Fire Suppression Piping and Equipment
210553	Identification for Fire-Suppression Piping and Equipment
211313	Wet-Pipe Sprinkler Systems
Division 22	
220517	Sleeves and Sleeve Seals for Plumbing Piping
220518	Escutcheons for Plumbing Piping
220529	Hangers and Supports for Plumbing Piping and Equipment
220553	Identification for Plumbing Piping and Equipment
221116	Domestic Water Piping
221119	Domestic Water Piping Specialties
221316	Sanitary Waste and Vent Piping

221319	Sanitary Wate Piping Specialties
221319.13	Sanitary Drains
223300	Electric, Domestic-Water Heaters
224213.13	Commercial Water Closets
224216.13	Commercial Lavatories
~~226213~~	~~Vacuum Piping for Laboratory and Healthcare Facilities~~
~~226313~~	~~Gas Piping for Laboratory and Healthcare Facilities~~
Division 23	
230513	Common Motor Requirements for HVAC Equipment
230553	Identification for HVAC Piping and Equipment
230593	Testing, Adjusting, and Balancing for HVAC
230713	Duct Insulation
230923	Direct Digital Control (DDC) System for HVAC
233113	Metal Ducts
233300	Air Duct Accessories
233423	HVAC Power Ventilators
233600	Air Terminal Units
237416	Packaged Rooftop Air-Conditioning Units
Division 26	
260010	Supplemental Requirements for Electrical
~~260505~~	~~Selective Demolition for Electrical~~
260519	Low-Voltage Electrical Power Conductors and Cables
260526	Grounding and Bonding for Electrical Systems
260529	Hangers and Supports for Electrical Systems
260533.13	Conduits for Electrical Systems
260533.16	Boxes and Covers for Electrical Systems
260533.23	Surface Raceways for Electrical Systems
260543	Underground Ducts and Raceways for Electrical Systems
260548	Vibration and Seismic Controls for Electrical Systems
260553	Identification for Electrical Systems
260573	Power System Studies
260800	Commissioning of Electrical Systems
260923	Lighting Control Devices
262200	Low-Voltage Transformers
262413	Switchboards
262416	Panelboards
262716	Electrical Cabinets and Enclosures
262726	Wiring Devices
262813	Fuses
262816	Enclosed Switches and Circuit Breakers
264313	Surge Protective Devices for Low-Voltage Electrical Power Circuits
265000	Lighting
Division 28	
284621.13	Conventional Fire-Alarm Systems

Division 31	
312000	Earthwork
312333	Trenching and Backfilling
Division 32	
321623	Sidewalks
Division 33	
331416	Site Water Utility Distribution Piping
333100	Sanitary Utility Sewerage Piping

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NOTICE INVITING SEALED PROPOSALS (NIB)
For
JOINT UTILITIES LABORATORY BUILDING
RENOVATION & EXPANSION PROJECT
PROJECT No. 521028

NOTICE IS HEREBY GIVEN that the City Council of the City of Redlands invites all and will receive sealed Proposals (Bids) at the office of the City Clerk, City of Redlands, 35 Cajon Street, Suite 4, Redlands, CA 92373, on **August 26, 2025**, up to the hour of **2:00 p.m.,** at which time they will be opened and publicly read. Bids shall be marked: **BID FOR: Joint Utilities Laboratory Building Renovation & Expansion Project, Project No. 521028.**

The City Council of the City of Redlands reserves the right to reject any and all Bids, to waive any irregularity, and award contracts in the best interests of the City.

The City of Redlands utilizes PlanetBids, a web based bid management service to manage request for bids. PlanetBids does not charge a fee to access and view current project 'Request for Bids"; however, they require potential contractors, subcontractors and suppliers to provide contact information in order to download files, receive addendum notifications and to receive automatic updates or revisions to projects. PlanetBids can be accessed through the City of Redlands website at http://www.cityofredlands.org/RFP.

Proposals (Bids) shall be executed on the separately bound forms included within the "Bid Submittal Package" in accordance with the instructions contained therein.

Bid security, in the form of a cashier's check, a certified check made to the order of the City of Redlands, or a Bidder's Bond, and in an amount not less than ten percent (10%) of the amount of the Bid is required to be submitted with each Bid. Said check or bond shall be given as a guarantee that the bidder will enter into contract with the City of Redlands if awarded the work, and will be declared forfeited if the selected bidder fails to enter into contract within fourteen (14) days after Notice of Award.

The Bidder to whom award is made will be required to furnish a Labor and Material Bond and a Faithful Performance Bond each in an amount of 100% of the Bid amount, from surety company satisfactory to the City of Redlands.

Pursuant to CA Labor Code Section 1770 et seq., the successful bidder shall pay not less than the prevailing rate of per diem wages as determined by the Director of the California Department of Industrial Relations. Copies of such prevailing rate of per diem wages are available at http://www.dir.ca.gov/OPRL/PWD/. Copies of the prevailing wage determination are also on file at the City of Redlands and shall be made available to any interested party upon request.

Pursuant to provisions of Section 22300 of the California Public Contract Code, the Contractor may substitute securities for any monies withheld by the City to ensure performance of the work.

Pursuant to the provisions of Section 3300 of the California Public Contract Code, Bidders shall be licensed as "Class A" or "Class B" and provide their California State Contractor's License numbers to the City. In addition, no contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)]. No contractor or subcontractor may be awarded a contract for public work on a public works project (awarded on or after April 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5. This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

All terms and conditions contained in the Contract Documents including the Instructions to Bidders shall become a part of the Contract. No Bidder may withdraw their Bid for a period of sixty (60) days after the time of Bid Opening.

All questions related to this project shall be directed to Goutam K. Dobey, Project Manager, at 909-798-7584 Ext 2. It shall be understood, however, that no specification interpretations will be made by telephone, nor will any products be considered for approval prior to award of the Contract. Changes, if any, will be made by addendum prior to the opening of Bids.

BY ORDER OF THE CITY COUNCIL OF THE CITY OF REDLANDS, SAN BERNARDINO COUNTY, CALIFORNIA.

Jeanne Donaldson, City Clerk,
City of Redlands
San Bernardino County, California

BID DOCUMENTS
(BD)

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INSTRUCTIONS TO BIDDERS
For
JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT
PROJECT No. 521028

Bids to receive consideration shall be made in accordance with the following instructions:

1. PROPOSALS:

a. Bids shall be made upon the form of proposal furnished by the City. All Bids shall be properly executed with all items filled in; the signatures of all persons signing shall be in longhand. If the unit price and the total amount named by a Bidder for any item are not in agreement, the unit price shall be considered as representing the Bidder's intention, and the totals may be corrected by the Engineer to conform thereto. If the sum of the individual bid item's and the total amount named by a Bidder are not in agreement, the sum of the bid item's shall be considered as representing the Bidder's intention, and the totals may be corrected by the Engineer to conform thereto. If the total price written in words and the total price written in figures are not in agreement, then the total price written in words will be considered as representing the Bidder's intention, and the totals will be corrected by the Engineer to conform thereto.

b. Proposals may be rejected if they show any alterations of form, additions not called for, conditional or alternative bids, incomplete Bids, erasures, or irregularities of any kind. Mistakes shall be lined through and the correct amount written above and initialed by the authorized agent of the Bidder.

c. Bids shall be accompanied by a cashier's or a certified check or Bidder's admitted corporate surety bond, in an amount not less than ten percent (10%) of the bid, made payable to the City of Redlands. Said check or bond shall be given as a guarantee that the Bidder will enter into a contract if awarded the work. In the case of refusal or failure to enter into said Contract, within fourteen (14) days after Notice of Award by the City in writing, the security shall be applied by the City to the difference between such bid and next lowest acceptable bid and surplus, if any, shall be returned to Bidder if cash or check is used, or to Surety if bid bond is used.

d. Before submitting a bid, Bidders shall carefully examine the Plans; read the Specifications; read all other Contract documents; shall visit the site of the work; shall fully inform themselves as to all existing conditions and limitations; and include in the bid a sum to cover the cost of all items included in the Contract. No allowance will be made due to lack of examination or knowledge. The submission of a bid shall be conclusive evidence that the bidder has investigated and is satisfied as to the conditions to be encountered as to character, quality and scope of work to be performed; the quantities of materials to be furnished; and as to the requirements of the Bid Proposal, plans and specifications.

e. Pursuant to CA Labor Code Section 1770 et seq., the successful bidder shall pay not less than the prevailing rate of per diem wages as determined by the Director of the California Department of Industrial Relations. Copies of such prevailing rate of per diem wages are available at http://www.dir.ca.gov/OPRL/PWD/. Copies of the prevailing wage determination are also on file at the City of Redlands and shall be made available to any interested party upon request.

f. The bid must be submitted on or before the date and time specified in the Notice Inviting Sealed Proposals (Bids). The bid shall be submitted in a sealed envelope marked in the lower left corner as follows:

BID FOR: JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT PROJECT No. 521028

g. Bids will be opened and publicly read aloud at the time set in the Notice Inviting Sealed Proposals (Bids), in the Office of the City Clerk, Civic Center, 35 Cajon Street, Suite 4, Redlands, California.

2. AGREEMENT AND BONDS:

The form of Contract which the successful Bidder, as Contractor, will be required to execute is included in the Contract Documents (CD) of these specifications and should be carefully examined by the Bidder. The Agreement, admitted Corporate Surety Bonds and other documents to be executed by the Contractor shall be executed in original-duplicates stamped according to law, one of which original-duplicates shall be filed with the City Clerk of the City of Redlands. The successful Bidder, simultaneously with the execution of the Agreement, will be required to furnish a faithful performance bond and a labor and material bond, each in an amount equal to one hundred percent (100%) of the Contract price. Said bonds shall provide that if the Contractor or their Subcontractor fails to pay for any materials, provision, provender or other supplies or items used in, upon, for or about the performance of the work contracted to be done, or for any work of labor thereon of any kind, or for amounts due under the Unemployment Insurance Act or Workman's Compensation, with respect to such work or labor, that the surety or sureties will pay for the same. The amount shall not exceed the sum specified in the bond, and also, in case suit is brought upon the bond, a reasonable attorney's fee to be fixed by the court. All bonds shall be secured from surety companies satisfactory to the City of Redlands and whose name is on file with the County Clerk of San Bernardino County, as an approved and financially sound surety company authorized to transact business in this state.

3. WITHDRAWAL OF BIDS:

a. Any Bidder may withdraw his Bid, only by written request, at any time prior to the scheduled time for Bid Opening.

b. No Bidder may withdraw his Bid for a period of sixty (60) days after the time of Bid Opening except as allowed by the California Public Contract Code.

4. INSURANCE AND HOLD HARMLESS REQUIREMENTS:

Before entering into a Contract, the Bidder to whom the Contract has been awarded shall furnish satisfactory evidence that they have secured all required insurance from a responsible insurance company authorized to do business in California and satisfactory to the City, and such insurance shall be maintained in full force and effect at the Contractor's own expense during the life of the Contract. Contractor shall furnish the City with the customary Certificates of Insurance for all required insurance listed below. General Liability Insurance shall name the City and the Consultant, as an additional insured and shall be primary and non-contributing to any insurance or self-insurance maintained by the City. All liability insurance policies shall bear an endorsement or shall have attached a rider whereby it is provided that, in the event of expiration or proposed cancellation of such policies for any reason whatsoever, the City shall be notified by registered mail, return receipt requested, giving sufficient time before the date thereof to comply with any applicable law or statute, but in no event less than forty five (45) days before expiration or cancellation is effective.

The coverage shall provide the following minimum limits based on the type of work proposed under this Contract. The Contractor shall determine if the proposed work requires Tier 1 or Tier 2 Insurance Requirements as follows:

CONTRACTED OPERATIONS DESIGNATED AS TIER 1		
Air Conditioning (HVAC) Systems (installation)	Electric Light or Power Line Construction	Pipeline Construction
Airport Runways (paving, repaving, etc.)	Elevator Work	Roofing
Blasting Operations	Excavation	Sandblasting
Bridge or Elevated Highway Construction	Fire Suppression Systems (installation)	Sewer and Water Main Construction
Buildings Structural Work (including elevators)	Gas Mains or Connections Construction	Sign Erection (streets)
Building Structure (raising or moving)	Geophysical Exploration	Solar Energy
Cable Installation in Conduits and Conduit Construction (streets)	Grading of Land	Street Cleaning
Caisson or Cofferdam Work	Hazardous Materials Contractors	Street or Road Construction
Dam or Reservoir Construction	Irrigation or Drainage Construction	Tank Construction, Installation, Erection or Repair
Demolition (structures)	Landscape Construction (street or street medians)	Telephone or Cable Line Construction
Drilling	Painting (exterior greater than single story)	Tree Pruning, Dusting, Spraying or Removal

TIER 1 DESIGNATED INSURANCE REQUIREMENTS

a. Commercial General Liability
   - $1 Million Per Occurrence/ $2 Million Aggregate
     - City listed as an Additional Insured on the coverage
     - Coverage is primary and non-contributory
     - If scope of work is within 50 feet of any railroad, endorsement citing inclusion of liability associated with this work is required
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission

b. Business Auto Liability
   - $1 Million Combined Single Limit
     - City listed as an Additional Insured on the coverage
     - Must include liability arising from all owned, leased, hired, and non-owned autos
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission
   - If Contractor or its subcontractors or suppliers haul hazardous material (including, without limitation, waste), Auto Liability insurance must be applicable to all hazardous waste hauling vehicles, and include MCS 90 and CA9948 Endorsements.

c. Commercial Umbrella/ Excess Liability
   - $5 Million Per Occurrence/ Aggregate
     - City listed as an Additional Insured on the coverage
     - Coverage is primary and non-contributory
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission

d. Workers Compensation
   - $1 Million Per Occurrence for Bodily Injury by Accident
   - $1 Million Each Employee for Bodily Injury by Disease
   - $1 Million Policy Limit for Bodily Injury by Accident
     - Waiver of Subrogation in favor of City
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission

e. Pollution Policy (Hazardous Materials) [If Applicable]
   - Required of Projects that involve Demolition and/or Excavation Activities
   - $1 Million Per Occurrence/ $2 Million Aggregate
   - City listed as an Additional Insured on the coverage

CONTRACTED OPERATIONS DESIGNATED AS TIER 2		
Air Conditioning (HVAC) Systems (service and repair)	Carpentry (building interiors)	Fire Suppression Systems (service and repair)
Alarms and Alarm Systems	Communications Equipment Installation (interior)	Landscape Construction
Building Interior Work (service, repair and non-structural remodeling)	Driveway, Parking Area or Sidewalk (paving or repaving)	Painting (exterior)
Cable Installation in Conduits (buildings)	Fence Erection	All Other Job Types including Vendors

TIER 2 DESIGNATED INSURANCE REQUIREMENTS

a. Commercial General Liability
   - $1 Million Per Occurrence/ $2 Million Aggregate
     - City listed as an Additional Insured on the coverage
     - Coverage is primary and non-contributory
     - If scope of work is within 50 feet of any railroad, endorsement citing inclusion of liability associated with this work is required
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission

b. Business Auto Liability
   - $1 Million Combined Single Limit
     - City listed as an Additional Insured on the coverage
     - Must include liability arising from all owned, leased, hired, and non-owned autos
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission
   - If Contractor or its subcontractors or suppliers haul hazardous material (including, without limitation, waste), Auto Liability insurance must be applicable to all hazardous waste hauling vehicles, and include MCS 90 and CA9948 Endorsements.

c. Workers Compensation
   - $1 Million Per Occurrence for Bodily Injury by Accident
   - $1 Million Each Employee for Bodily Injury by Disease
   - $1 Million Policy Limit for Bodily Injury by Accident
     - Waiver of Subrogation in favor of City
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission

d. Pollution Policy (Hazardous Materials) [If Applicable]
   - Required of Projects that involve Demolition and/or Excavation Activities
   - $1 Million Per Occurrence/ $2 Million Aggregate
   - City listed as an Additional Insured on the coverage

Contractor expressly waives all rights to subrogation against the City, its officers, employees and volunteers for losses arising from work performed by Contractor for City by expressly waiving Contractor's immunity for injuries to Contractor's employees and agrees that the obligation to indemnify, defend and hold harmless provided for in this Agreement extend to any claim brought by or on behalf of any employee of Contractor. This waiver is mutually negotiated by the parties. This shall not apply to any damage resulting from the sole negligence of City, its agents and employees. To the extent any of the damages referenced herein were caused by or resulted from the concurrent negligence of City, its agents or employees, the obligations provided herein to indemnify, defend and hold harmless are valid and enforceable only to the extent of the negligence of contractor, its officers, agents and employees.

Subcontractors. The prime contractor shall include all subcontractors as insureds under its policies or shall furnish separate certificates and endorsements from each subcontractor.

The Contractor shall not assign or sublet the contract, in whole or in part, without the written consent of the City, nor shall the contractor assign any monies due to, or to become due to, Contractor hereunder without prior written consent of the City.

The Contractor shall be fully responsible to the City for the acts and omissions of the subcontractor and persons either directly or indirectly employed by the Contractor. Consent to subcontracting part of the work shall, in no way, release the Contractor from responsibility for performance of the work, and Contractor will be held, in all respects, accountable for the same as if no consent had been given. The Contractor shall give personal attention to this work which is sublet. Nothing contained in the contract documents shall create any contractual relation between any subcontractor and the City.

Hold Harmless and Indemnification. Contractor shall indemnify, hold harmless and defend City and its elected officials, agents and employees and the Consultant from and against any and all claims, losses or liability, including attorney's fees, arising from injury or death to persons or damage to property occasioned by any act, omission or failure to act of Contractor, its subcontractors, and any officers, agents and employees in performing the work required by this Agreement. Contractor's obligations under this provision shall not be limited in any way by any terms of this Agreement, or the insurance limits.

5. LICENSES AND PERMITS:

No bid will be accepted from a Contractor who is not licensed in accordance with the law under the provisions of Division III, Chapter 9 of the Business and Professions Code of the State of California.

The Contractor shall, at the time of bid opening, possess a valid "Class A" or "Class B" Contractor's license, and provide its California State Contractor's License number to the City.

All subcontractors listed at the time of bid opening shall possess a valid Contractor's license for the work in which they are specified to complete within the Bid Submittal Package.

The Contractor shall, prior to Notice to Proceed, procure all other permits and licenses as stipulated in the GENERAL CONDITIONS.

In addition, no contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015 or awarded on or after April 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5. Contractors shall submit proof of registration status with their bid submission to the City of Redlands. This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

6. SUBSTITUTION OF SECURITIES:

In accordance with applicable provisions of State law, the Contractor will be permitted to substitute qualified securities in lieu of retention of withheld progress payments by the Owner.

7. SUBCONTRACTORS:

Pursuant to Section 4105 of the California Public Contract Code, the bidder may not circumvent the requirement to list subcontractors by the device of listing one subcontractor, who in turn sublets portions constituting a majority of the work covered by the contract.

A. Pursuant to California Government Code section 4106, subcontractors who will perform work or labor or render services in an amount in excess of one-half of one percent of the Contractor's total bid shall be set forth in a list of subcontractors within the bid documents. Such list shall be accompanied by an experienced statement with pertinent information regarding similar projects and other evidence of qualifications for each such subcontractor, supplier, individual, or entity if requested by City. If City or engineer, after doing an investigation, has reasonable objection to any proposed subcontractor, supplier, individual, or entity, City may, before the notice of award is given, request the apparent successful bidder to submit a substitute, without an increase in the bid.

B. If the apparent successful bidder declines to make any such substitution, City may award the contract to the next lowest bidder that proposes to use acceptable subcontractors, suppliers, individuals, or entities declining to make the request and substitutions will not constitute grounds for forfeiture of the bid security of any bidder. Any subcontractor, supplier, individual or entity so listed and against which City makes no written objection prior to the giving of the notice of award will be deemed acceptable by City subject to verification of such assessments after the effective date of the agreement as provided herein.

8. NON DEBARRED CONTRACTORS AND SUBCONTRACTORS

The Contractor and all of its subcontractors shall, at the time of bid opening and for performance of this public works contract, be non-debarred contractors and not be ineligible Contractors pursuant to Public Contract Code section 6109 and Labor Code sections 1777.1 and 1777.7.

9. LABOR LAW REQUIREMENTS

Prior to the start of construction, the Contractor and each subcontractor shall submit to the City an executed Checklist of Labor Law Requirements, included within Appendix A, certifying that each Contractor and Subcontractor will comply with the foregoing Labor Law requirements; and fully understands that failure to comply with these requirements will subject it to the penalties cited herein.

By submitting a bid, the prime contractor and subcontractors involved in this project assure that they intend to comply with the labor law requirements noted within Appendix A, fully understanding that failure to comply may subject them to penalties as noted.

10. BID PROTEST PROCEDURES

Any bid protest must be in writing and received by the City Clerk's Office at 35 Cajon Street, Suite 4, Redlands, CA 92373, before 5:00 p.m. no later than two working days following the bid opening (the "Bid Protest Deadline") and must comply with the following requirements:

10.1 General. Only a bidder who has actually submitted a Bid Proposal is eligible to submit a bid protest against another bidder. Subcontractors are not eligible to submit bid protests. A bidder may not rely on the bid protest submitted by another bidder, but must timely pursue its own protest. If required by City, the protesting bidder must submit a non-refundable fee in the amount specified by City, based upon City's reasonable costs to administer the bid protest. Any such fee must be submitted to City no later than the Bid Protest Deadline, unless otherwise specified. For purposes of this Section, a "working day" means a day that City is open for normal business, and excludes weekends and holidays as observed by the City.

10.2 Protest Contents. The bid protest must contain a complete statement of the basis for the protest and all supporting documentation. Material submitted after the Bid Protest Deadline will not be considered. The protest must refer to the specific portion or portions of the Contract Documents upon which the protest is based. The protest must include the name, address, email address, and telephone number of the person representing the protesting bidder if different from the protesting bidder.

10.3 Copy to Protested Bidder. A copy of the protest and all supporting documents must be concurrently transmitted by fax or by email, by or before the Bid Protest Deadline, to the protested bidder and any other bidder who has a reasonable prospect of receiving an award depending on the outcome of the protest.

10.4 Response to Protest. The protested bidder may submit a written response to the protest, provided the response is received by the City Clerk's Office before 5:00 p.m., within two working days after the Bid Protest Deadline or after actual receipt of the bid protest, whichever is sooner (the "Response Deadline"). The response must include all supporting documentation. Material submitted after the Response Deadline will not be considered. The response must include the name, address, email address, and telephone number of the person representing the protested bidder if different from the protested bidder.

10.5 Copy of Protesting Bidder. A copy of the response and all supporting documents must be concurrently transmitted by fax or by email, by or before the Bid Protest Deadline, to the protesting bidder and any other bidder who has a reasonable prospect of receiving an award depending upon the outcome of the protest.

10.6 Exclusive Remedy. The procedure and time limits set forth in this section are mandatory and are the bidder's sole and exclusive remedy in the event of a bid protest. A bidder's failure to comply with these procedures will constitute a waiver of any right to further pursue a bid protest, including filing a Government Code Claim or initiation of legal proceedings.

10.7 Right to Award. The City Council reserves the right to award the Contract to the bidder it has determined to be the responsible bidder submitting the lowest responsive bid, and to issue a notice to proceed with the Contract notwithstanding any pending or continuing challenge to its determination.

PROPOSAL

TO: THE CITY OF REDLANDS, SAN BERNARDINO COUNTY, CALIFORNIA herein called the "City".

Pursuant to and in compliance with your Notice Inviting Bids, and the other documents relating thereto, the undersigned Bidder, having familiarized themselves with the terms of the Contract, the local conditions affecting the performance of the Contract and the cost of the work at the place where the work is to be done, and with the plans thereto, hereby proposes and agrees to perform within the time stipulated, the Contract, including all of its component parts and everything required to be performed, and to provide and furnish any and all of the labor, materials, tools, equipment and all utility and transportation services necessary to perform the contract, and complete in a workmanlike manner, all of the work covered by the contract in connection with the City's Project identified as

JOINT UTILITIES LABORATORY BUILDING RENOVATION & EXPANSION PROJECT
PROJECT No. 521028

NOTE: Bidders must bid each item in this schedule. All entries in the entire PROPOSAL must be made clearly and in ink. Mistakes shall be lined through and the correct amount written above and initialed by the authorized agent of the Bidder.

BID SCHEDULE

(See "Section 01200 – Measurement and Payment" for Bid Item description)

Item No.	Brief Description	Estimated Quantity	Unit Price (If Applicable)	Total Price in Figures
1	Mobilization (Maximum 5% of Total Bid Price)	LUMP SUM	N/A	$_____
2	Site Demolition	LUMP SUM	N/A	$_____
3	Removal of all trash and debris, shrubs, bushes, and pavement	LUMP SUM	N/A	$_____
4	Civil Site Work	LUMP SUM	N/A	$_____
5	Reroofing of Existing Building Work	LUMP SUM	N/A	$_____
6	Concrete Work	LUMP SUM	N/A	$_____

BID SCHEDULE (CONTINUED)

(See "Section 01200 – Measurement and Payment" for Bid Item description)

Item No.	Brief Description	Estimated Quantity	Unit Price (If Applicable)	Total Price in Figures
7	Structural Work	LUMP SUM	N/A	$_____
8	CMU Walls and Masonry Work	LUMP SUM	N/A	$_____
9	Architectural Work	LUMP SUM	N/A	$_____
10	HVAC Work	LUMP SUM	N/A	$_____
11	Plumbing Work	LUMP SUM	N/A	$_____
12	Electrical Work	LUMP SUM	N/A	$_____
13	Fire Protection Systems (Including Fire Alarm and Sprinklers)	LUMP SUM	N/A	$_____
14	Demobilization	LUMP SUM	N/A	$_____
15	Remaining Work Not Specifically Listed	LUMP SUM	N/A	$_____
16	Contingency: Unforeseen work not covered within all other bid items	LUMP SUM	N/A	$300,000.00
			BID TOTAL PRICE (ITEMS 1-16)	**$_____**

Last Minute Additions/Deductions*_____ Bid Item No._____

Last Minute Additions/Deductions*_____ Bid Item No._____

Last Minute Additions/Deductions*_____ Bid Item No._____

BID SCHEDULE TOTAL PRICE: $_____

BID SCHEDULE TOTAL PRICE WRITTEN IN WORDS: _____

_____

_____

* Provision is made here for the Bidder to include an addition or deduction in its bid, if it wishes, to reflect any last-minute adjustments in prices. The addition or deduction, if made, will be proportionately applied to the Progress Payments total for the respective item in the Schedule of Prices, the amount being added or deducted for each monthly payment. The unit prices entered in the Schedule of Prices will not be affected.

LOW BID DETERMINATION:

The low bid will be determined pursuant to Public Contract Code Section 20103.8 as the lowest bid price on the Bid Schedule Total Price on page BD 11.

A responsible bidder who submits the lowest bid as determined by the above method shall be awarded the contract, if it is awarded, by the City Council of the City of Redlands. The bid bond shall be 10 percent of the total bid amount.

ADDENDA

Receipt of the following addenda is hereby acknowledged and the same is included in the Bid Price:

Addendum #1_____ (initials) Addendum #2_____ (initials) Addendum #3_____ (initials)

Addendum #4_____ (initials) Addendum #5_____ (initials) Addendum #6_____ (initials)

ATTEST: (if Corporation)

(Corporation Seal)

_____ _____

Company Name Signature

_____ _____

Address Name

_____ _____

City, State, Zip Title

BID CERTIFICATION

The undersigned certifies that they are familiar with the various State and local laws affecting labor, length of working days, employer's liabilities, Sunday work, alien labor, domestic materials, Subcontractors, etc.

It is understood and agreed that the work under the contract will be commenced by the undersigned Bidder, if awarded the contract, within ten (10) calendar days from the date in the Notice to Proceed and will be completed by the Contractor in the time set forth in the **CONTRACT**.

Enclosed find Bidders bond or certified or cashier's check No. _____ on the _____ Bank, in the amount of _____ _____ which is not less than ten percent (10%) of the Bid submitted by the undersigned, made payable to the City of Redlands, California and which is given as a guarantee that the Bidder agrees that in case of their default in executing said contract with necessary bonds, the bond or check accompanying this Bid and the money made payable shall become and remain the property of the City of Redlands.

It is understood and agreed that the City of Redlands has the right to waive defects or irregularities and to accept or reject any or all Bids. No Bidder may withdraw their Bid for a period of sixty (60) days after the time of the Bid Opening except as allowed by the California Public Contract Code.

The following information, required by State law under penalty of perjury, is true and correct. Failure to complete this information renders the bid non-responsive, and the bid must be rejected.

_____	_____
Company Name	Signature
_____	_____
Address	Signatory's Title
_____	_____
City, State, Zip	State License Number and Class
_____	_____
Telephone Number	License Expiration Date

Dated this _____ day of _____, 20___.

BID BOND

KNOW ALL PERSONS BY THESE PRESENTS,

That _____ as Principal, and _____ as Surety, are held and firmly bound unto the City of Redlands, hereinafter called City, in the sum of _____ dollars, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, said Principal has submitted a bid to said City to perform all work required under the PROJECT No. 521028.

NOW, THEREFORE, if said Principal is awarded a contract by said City and, within the time and in the manner required under the heading "Instructions to Bidders" bound with said Specifications, enters into a written contract on the form of agreement bound with said Specifications and furnishes the required bonds, one to guarantee faithful performance and the other to guarantee payment for labor and materials; then this obligations shall be null and void, otherwise it shall remain in full force and effect. In the event suit is brought upon this bond by said City and Judgment is recovered, said Surety shall pay all costs incurred by said City in such suit, including a reasonable attorney's fee to be fixed by the court.

SIGNED AND SEALED, this _____ day of _____, 20____.

_____**(SEAL)**
(Principal)

By:_____
(Signature)

_____**(SEAL)**
(Surety)

By:_____
(Signature)

Address:_____

_____

Telephone (___)_____

(Seal and Notarial Acknowledgment of Surety)

STATEMENT BY BIDDER
NON-COLLUSION AFFIDAVIT

STATE OF)
) ss
COUNTY OF)

_____, being first duly sworn, deposes and says that

he is
(Sole Owner, a Partner, President, Secretary, etc.)

of
(Contractor)

the party making the foregoing bid on PROJECT No. 521028 that such bid is not made in the interest of or on behalf of any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the Bidder has not directly or indirectly induced or solicited any other Bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any Bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the Bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the Bidder or of any other Bidder or to fix any overhead, profit, or cost element of the bid price or of that of another bidder, or to secure any advantage against the public body awarding the Contract of anyone interested in the proposed contract; that all statements contained in such bid are true; and further, that the Bidder has not directly or indirectly, submitted his bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company, association organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

By: _____ Title: _____

Subscribed and sworn to before me this _____ day of _____, 20___.

Signature of Officer Administering Oath
(Notary Public)

STATEMENT BY BIDDER
OFFICERS OF CORPORATION (Members of Firm)

The names of all persons interested in the foregoing proposals as principals, are as follows: (IMPORTANT NOTICE - if Bidder or other interested person is a corporation, state legal name of corporation, also names of the president, secretary, treasurer and manager thereof; if a co-partnership, state true name of firm, also names of all individual co-partners composing firm; if Bidder or other interested person is an individual, state first and last names in full).

_____ _____

_____ _____

_____ _____

Licensed in accordance with an act providing for the Registration of Contractors, License

No. _____.

Signature of Bidder _____ Dated_____

NOTE: If Bidder is a corporation, the legal name of the corporation shall be set forth above, together with the signature of the officer(s) authorized to sign contracts on behalf of the corporation; if Bidder is a co-partnership, the true name of the firm shall be set forth above, together with the signature of the partner or partners authorized to sign contracts in behalf of the co-partnership, and if the Bidder is an individual, that signature shall be placed above.

STATEMENT BY BIDDER
SUB-CONTRACTORS LIST

Bidder supplies the following information for any Subcontractor who will perform work or labor or render services to the prime contractor, etc. to be used on PROJECT No. 521028, all in accordance with Section 4104 of the California Public Contract Code.

LICENSED SUBCONTRACTOR'S NAME AND BUSINESS ADDRESS	LICENSE #	SPECIFIC DESCRIPTION OF SUBCONTRACT & BID ITEM #	% OF BID ITEM TO BE PERFORMED

STATEMENT BY BIDDER
QUALIFICATION AND EXPERIENCE STATEMENT

The following outline is a record of the undersigned Bidder's experience in construction of three (3) projects of a type similar in magnitude and character to that contemplated under PROJECT No. 521028 within the past two years. Include the location of each project as well as the name, address, and phone number of the owner, and name of individual to contact.

Subcontractors performing in excess of one half of one percent of the prime Contractor's total bid, or in the construction of streets or highways, one half of one percent of the prime contractor's total bid or ten thousand dollars ($10,000), whichever is greater shall provide a similar outline. Additional pages outlining this portion of the Bid may be attached. Failure to provide this statement may result in rejection of the bid by the City of Redlands.

1. Owner's Name: _____

   Contact Person: _____ Phone: ( ) _____

   Address of Owner: _____

   Project Description: _____

   _____

   Amount of Contract: _____ Completion Date: _____

2. Owner's Name: _____

   Contact Person: _____ Phone: ( ) _____

   Address of Owner: _____

   Project Description: _____

   _____

   Amount of Contract: _____ Completion Date: _____

3. Owner's Name: _____

   Contact Person: _____ Phone: ( ) _____

   Address of Owner: _____

   Project Description: _____

   _____

   Amount of Contract: _____ Completion Date: _____

STATEMENT BY BIDDER
GENERAL INFORMATION

1. Bidder's Mailing Address _____

   _____

2. Number of years engaged in the contracting business under your present firm or trade name:

   _____

3. Have you ever failed to complete any work awarded to you? (Yes or No) _____. If yes, provide details in the space provided in Item 10.

4. Have you ever defaulted on a contract? (Yes or No) _____. If yes, provide details in the space provided in Item 10.

5. Have you ever been a party to a lawsuit or gone to arbitration during the last 5 years? (Yes or No) _____. If yes, provide details in the space provided in Item 10.

6. Has any Stop Notice been filed against you during the last 5 years? (Yes or No) ___. If yes, provide details in the space provided in Item 10.

7. Has your contractor's license ever been suspended, revoked, or subject to disciplinary action? (Yes or No) _____. If yes, provide details in the space provided in Item 10.

8. Contracts currently on hand:

Agency Name	Amount of Contract	Start Date	Completion Date

9. Enter the name of person(s) who inspected the site of the proposed work for your firm and the date of said site inspection.

   Name:_____ Date:_____

10. In the space provided, the Bidder shall provide details concerning any "Yes" answers provided in this "General Information" section. Details shall include, but not be limited to, the nature of dispute, name of the agency involved and the final outcome. If requested by the City, the Bidder shall supply additional information, sufficiently detailed, to permit evaluation of the Bidder's ability to perform the work.

Question Number	Details

CONTRACT DOCUMENTS
(CD)

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PUBLIC WORK CONSTRUCTION CONTRACT

This Public Work Construction contract ("Contract") is made and entered into this ___ day of _____, 2025, by and between the City of Redlands, a municipal corporation, organized and existing under the laws of the State of California (hereinafter "City"), and _____ (hereinafter "Contractor"). City and Contractor are sometimes individually referred to herein as a "Party" and, together, as the "Parties."

In consideration of the mutual promises contained herein, City and Contractor agree as follows:

1. **SCOPE OF WORK:** Contractor shall furnish all materials and will perform all of the work for the following: Joint Utilities Laboratory Building Renovation & Expansion Project, complete all items as required by the Contract Documents (as herein defined) and Specifications for City's Joint Utilities Laboratory Building Renovation & Expansion Project, Project No. 521028 (the "Work").

2. **CONTRACT SUM:** City shall pay Contractor the sum of _____ dollars ($_____) as consideration for its performance of the Work in accordance with the terms and conditions set forth in the Contract Documents. Pursuant to Public Contract Code Section 22300, Contractor has the option to deposit securities with an escrow agent as a substitute for retention of earnings required to be withheld by City pursuant to an escrow agreement as set forth in Public Contract Code section 22300.

3. **TIME FOR COMPLETION:** The Work shall be completed within two hundred seventy (270) working day(s) as defined in Section 1-2 of the Standard Specifications for Public Works Construction "Greenbook" from and after the date of City's issuance of a Notice to Proceed to Contractor.

4. **LIQUIDATED DAMAGES:** Contractor's failure to complete the Work within the time allowed will result in damages being sustained by City. Such damages are, and will continue to be, impracticable and extremely difficult to determine. Accordingly, Contractor shall pay to City, or have withheld from monies due to Contractor, the sum of five hundred dollars ($500) for each working day as defined in Section 1-2 of the Standard Specifications for Public Works Construction "Greenbook" in excess of the specified time for completion of the Work. Execution of this Contract shall constitute agreement by City and Contractor that five hundred dollars ($500) per day is the estimated damage to City caused by the failure of Contractor to complete the work within the allowed time. Such sum is liquidated damages and shall not be construed as a penalty, and may be deducted from payments due Contractor if such delay occurs.

5. **CONTRACT DOCUMENTS:** This Contract incorporates by reference the following: Notice Inviting Bids, Instructions to Bidders, Contractor's Proposal, Bid Bond, Agreement, Performance Bond, Labor and Material Bond, Plans, General Conditions, Special Provisions and Specifications, and any addenda thereto (collectively, the "Contract Documents").

6. **ATTORNEYS' FEES:** In the event any action is commenced to enforce or interpret the terms or conditions of this Contract, or the Contract Documents, the prevailing Party in such action, in addition to any costs and other relief, shall be entitled to recover its reasonable attorneys' fees, including fees for use of in-house counsel by a Party.

7. **RESOLUTION OF CONSTRUCTION CLAIMS:** Claims by Contractor in the amount of three hundred seventy five thousand dollars ($375,000) or less shall be made by Contractor and processed by the City pursuant to the provisions of Part 3, Chapter 1, Article 1.5 of the Public Contract Code (commencing with Section 20104). All claims shall be in writing and include the documents necessary to substantiate the claim. Nothing in subdivision (a) of Public Contract Code Section 20104.2 shall extend the time limit or supersede the notice requirements provided in this case from filing claims by Contractor.

8. ELIGIBILITY OF CONTRACTOR/SUBCONTRACTOR: Contractor and all of its subcontractors shall abide by California Public Contract Code, Section 6109, and California Labor Code Sections 1777.1 and/or 1777.7, and certify that they are not debarred and are eligible to work on this project.

9. ASSIGNMENT OF AGREEMENT: No assignment by a Party of any rights or interests under this Contract shall be binding on another Party without the written consent of the Party sought to be bound.

10. SUCCESSORS AND ASSIGNS: City and Contractor each binds itself and their respective successors and assigns in respect to all covenants, agreements, and obligations contained in the Contract Documents.

11. SEVERABILITY: Any provision or part of the Contract Documents held to be void or unenforceable under any law or regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon City and Contractor.

IN WITNESS WHEREOF, the Parties hereto have executed this Contract the day and year first written above.

CITY OF REDLANDS

(SEAL)

By:_____
Mario Saucedo, Mayor

ATTEST:

_____
Jeanne Donaldson, City Clerk

(SEAL)

_____
Name of Contractor

By:_____
Signature of Authorized Agent

_____
Title

_____
Signature of Authorized Agent (if necessary)

_____
Title

_____
Contractor's License No.

WORKER'S COMPENSATION INSURANCE CERTIFICATION

Description of Contract: City of Redlands
Municipal Utilities and Engineering Department
Joint Utilities Laboratory Building Renovation & Expansion Project
Project No. 521028

Every employer, except the State, shall secure the payment of compensation in one or more of the following ways:

a. By being insured against liability to pay compensation by one or more insurers duly authorized to write compensation insurance in this State.
b. By securing from the Director of Industrial Relations, a certificate of consent to self-insure, either as an individual employer, or as one employer in a group of employers, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his or her employees.

CHECK ONE

_____I am aware of the provisions of Section 3700 of the Labor Code which requires every employer to be insured against liability for Workers' Compensation or to undertake self-insurance in accordance with the provisions of that Code, and I will comply with such provisions before commencing the performance of the work and activities required or permitted under this Agreement. (Labor Code §1861).

_____I affirm that at all times, in performing the work and activities required or permitted under this Agreement, I shall not employ any person in any manner such that I become subject to the workers' compensation laws of California. However, at any time, if I employ any person such that I become subject to the workers' compensation laws of California, immediately I shall provide the City with a certificate of consent to self-insure, or a certification of workers' compensation insurance.

I certify under penalty of perjury under the laws of the State of California that the information and representations made in this certificate are true and correct.

Dated this _____ day of _____, 2025.

_____
(Contractor)

_____
(Signature)

_____
(Official Title)

(SEAL)

(Labor Code Section 1861 provides that the above certificate must be signed and filed by the Contractor with the Owner prior to performing the work of the contract.)

FAITHFUL PERFORMANCE BOND

Whereas, the City of Redlands ("City"), State of California, and _____ (hereinafter designated as "Principal") have entered into an agreement dated _____, 2025 ("Agreement") whereby Principal agrees to install and complete certain public improvements (the "Work"), which said Agreement is identified as Joint Utilities Laboratory Building Renovation & Expansion Project and is hereby referred to and made a part hereof; and

Whereas, said Principal is required under the terms of the Agreement to furnish a bond for the faithful performance of the Work, now, therefore, we, the Principal and, _____, as Surety, are held and firmly bound unto the City in the penal sum of _____ dollars ($_____) lawful money of the United States, for the payment of which sum we bind ourselves, and our heirs, successors, executors and administrators, jointly and severally, firmly by these presents.

The condition of this obligation is such that if the above bounded Principal, his or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and provisions in the Agreement and any alteration thereof made as therein provided, on his or its part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall faithfully fulfill the one-year guarantee of all materials and workmanship, and shall defend, indemnify and save harmless the City and its elected officials, officers, agents and employees, as therein stipulated, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect.

As a part of the obligation secured hereby and in addition to the face amount specified therefor, there shall be included costs and reasonable expenses and fees, including reasonable attorneys' fees, incurred by the City in successfully enforcing such obligations, all to be taxed as costs and included in the judgment rendered.

As a condition precedent to the satisfactory completion of the Work, the above obligation shall hold good for a period of one (1) year or longer if required by the Agreement after the acceptance of the work by the City, during which time if the Principal shall fail to make full, complete, and satisfactory repair and replacements and totally protect the City from loss or damage made evident during this period from the date of completion of the Work, and resulting from or caused by defective materials or faulty workmanship, the above obligation in penal sum thereof shall remain in full force and effect. The obligations of Surety hereunder shall continue so long as any obligation of the Principal remains.

Whenever the Principal shall be, and is declared by the City to be, in default under the Agreement, the City having performed the City obligations thereunder, the Surety shall promptly remedy the default, or shall promptly, at the City's option:

1. Complete the Work in accordance with its terms and conditions; or

2. Obtain a bid or bids for completing the Work in accordance with its terms and conditions, and upon determination by Surety of the lowest responsive and responsible bidder, arrange for a contract between such bidder and the City, and make available as work progresses sufficient funds to pay the cost of completion of the Work less the balance of the Agreement price, but not exceeding, including other costs and damages for which Surety may be liable hereunder, the

amount set forth above. The term "balance of the Agreement price," as used in this paragraph, shall mean the total amount payable to the Principal by the City under the Agreement and any modifications thereto, less the amount previously properly paid by the City to the Principal.

Surety expressly agrees that the City may reject any contractor or subcontractor which may be proposed by Surety in fulfillment of its obligations in the event of default by the Principal.

Surety shall not utilize the Principal in completing the Work nor shall Surety accept a bid from the Principal for completion of the Work if the City, when declaring the Principal in default, notifies Surety of the City's objection to the Principal's further participation in the completion of the Work.

No right of action shall accrue on the bond to or for the use of any person or corporation other than the City named herein or the successors or assigns of the City. Any suit under this bond must be instituted within the applicable statute of limitations period.

The said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Agreement or to the work to be performed thereunder or the Specifications accompanying the same shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Agreement or to the work or to the specifications.

No final settlement between the City and the Principal shall abridge the right of any beneficiary hereunder whose claim may be unsatisfied.

The Principal and Surety agree that if the City is required to engage the services of any attorney in connection with the enforcement of this bond, each shall pay the City's reasonable attorneys' fees incurred, with or without suit, in addition to the above sum.

In witness whereof, this instrument has been duly executed by the Principal and Surety above named, on _____, 2025.

(SEAL)	(SEAL)
_____	_____
(Contractor)	(Surety)
_____	BY: _____
(Signature)	(Signature)
	Address:_____
	_____
(Seal and Notarial Acknowledgment of Surety)	Telephone ( )_____

LABOR AND MATERIAL BOND

Whereas, the City Council of the City of Redlands, State of California, and _____ (hereinafter designated as "Principal") have entered into an agreement (the "Agreement") whereby Principal agrees to install and complete certain designated public improvements (the "Work"), which said agreement, dated _____, 2025, and identified as Joint Utilities Laboratory Building Renovation & Expansion Project, Project No. 521028 is hereby referred to and made a part hereof; and

Whereas, under the terms of the Agreement, Principal is required before commencing the performance of the Work, to file a good and sufficient Labor and Material bond with the City of Redlands to secure the claims to which reference is made in Title 3 (commencing with Section 9550) of Part 6 of Division 4 of the Civil Code of the State of California.

Now, therefore, said Principal and the undersigned as corporate surety, are held firmly bound unto the City and all contractors, subcontractors, laborers, material men and other persons employed in the performance of the Agreement and referred to in the aforesaid Code of Civil Procedure in the sum of _____ dollars ($_____) for materials furnished or labor thereon of any kind, or for amounts due under the Unemployment Insurance Act with respect to such work or labor, that said surety will pay the same in an amount not exceeding the amount hereinabove set forth, and also in case suit is brought upon this bond, will pay, in addition to the face amount thereof, costs and reasonable expenses and fees, including reasonable attorneys' fees, incurred by the City in successfully enforcing such obligation, to be awarded and fixed by the court, and to be taxed as costs and to be included in the judgment therein rendered.

It is hereby expressly stipulated and agreed that this bond shall insure to the benefit of any and all persons, companies and corporations entitled to file claims under Title 3 (commencing with Section 9550) of Part 6 of Division 4 of the Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond.

Should the condition of this bond be fully performed, then this obligation shall become null and void, otherwise it shall be and remain in full force and effect.

The surety hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Agreement or the specifications accompanying the same shall in any manner affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition.

In witness whereof, this instrument has been duly executed by the Principal and surety above named, on _____, 2025.

(SEAL)	(SEAL)
_____	_____
(Contractor)	(Surety)
_____	BY: _____
(Signature)	(Signature)
	Address: _____
(Seal and Notarial Acknowledgement of Surety)	_____
	Telephone: ( )_____

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GENERAL CONDITIONS
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GENERAL CONDITIONS

The Standard Specifications for Public Works Constructions, 2021 Edition (Greenbook), together with supplements as published by Building News, Inc., are modified herein and comprise the Standard Specifications. For convenience, the section and subsection numbering system used in these modifications correspond to those used in the Greenbook. Unless specifically deleted or modified herein, all requirements of the Greenbook shall prevail.

SECTION 1 – GENERAL, TERMS, DEFINITIONS, ABBREVIATIONS, UNITS OF MEASURE, AND SYMBOLS

1-2 TERMS AND DEFINITIONS.

Agency - *Amend as follows:*
"The legal entity (City) for which the Work is being performed."

Bidder - *Amend as follows:*
"Any individual, firm, partnership, corporation, or combination thereof, licensed in accordance with the provisions of Chapter 9, Division III of the Business and Professions Code, submitting a Bid for the Work, acting directly or through a duly authorized representative."

City. The City of Redlands, San Bernardino County, California, being the legal entity for which the Work is being performed. Also referred to as Agency or Owner.

City Council. The City Council of the City of Redlands, San Bernardino County, California, being the body authorizing entrance into legal agreements and allowing work in public right-of-way or on public property controlled by the City of Redlands. Also referred to as Board.

Engineer - *Amend as follows:*
"The City Engineer of the Agency, or other person designated by the City Engineer, acting either directly or through authorized agents."

Fabricated. An item specifically assembled or made out of selected materials to meet individual design requirements.

Guarantee. See Warranty.

Laboratory. The designated laboratory authorized by the City of Redlands to test materials and work involved in the Contract.

Manufactured. A standard mass-produced unit or item meeting design requirements.

Owner. The City of Redlands, San Bernardino County, California.

Pavement. The uppermost layer of material placed on the traveled way or shoulder. Also referred to as surfacing.

Rain Day. A scheduled working day when you cannot perform work on the controlling activity for at least 50 percent of the day with at least 50 percent of the normal labor and equipment due to adverse weather-related conditions that cause the Contractor to dismiss the crew.

Street - *Delete and replace with the following:*
"Any road, highway, parkway, freeway, avenue, street, lane, alley, crossing, intersection, court, place, circle, walk, way, or any public right-of-way within the jurisdiction of the Agency."

Surety - *Delete and replace with the following:*
"An admitted corporate surety as listed by the United States Department of Treasury and duly licensed to conduct business in the State of California and County of San Bernardino and acceptable to the City of Redlands, bound with and for the Contractor for the acceptable performance, execution, and completion of the Work, and for the satisfaction of all obligations incurred."

Warranty. An extended insurance by the Contractor, of any product or item of work installed as a part of this project for replacement and/or repair for the time period specified, including but not limited to, all parts, labor, materials, tools, equipment costs, etc. necessary for the product or item of work to be in proper and acceptable working condition after completion of the project. For the purposes of this Contract, the period of coverage shall begin on the date of the Notice of Completion filed by the Owner.

Working Hours. Unless specified otherwise, working hours shall be from 7:00 AM to 4:00 PM, Monday through Friday, inclusive. Saturdays, Sundays, and City Holidays, as shown on the current year Construction Schedule, are excluded unless authorized by the City.

1-7.2 CONTRACT BONDS. - *Add the following sentence to paragraph 1:*
The warranty provisions set forth in Section 7-18 shall be secured by the Contract Performance Bond required under this section and said Bond shall remain in full force and effect for a period of one year from the date of completion as specified in the Notice of Completion.

SECTION 2 - SCOPE OF THE WORK

2-2 PERMITS. - *Amend the following:*

Amend the first sentence of paragraph 1 as follows:
"The Contractor will obtain all permits necessary to perform the work in streets, highways, railways or other rights-of-way."

Add the following sentence between the first and second sentences of paragraph 1:
For all work within Caltrans right-of-way, the Contractor shall obtain their own Caltrans Encroachment Permit and pay all necessary permit and inspection fees as required by Caltrans.

Add the following paragraph:
The Contractor shall, prior to the start of work, procure all permits and licenses, including but not limited to, a City Business License for itself, subcontractors, and all parties performing actions associated with this contract within the City of Redlands, City Truck Route Permit, City Street/Lane Closure Permit, City Encroachment Permit, USA Verification Number, DOSH Excavation Permit, other permits required by agencies and/or utilities having jurisdiction on the work, pay all charges and fees required by the City, other agencies and utilities, and give all notices necessary and incidental to the due and lawful prosecution of the work. All City permits associated with this project are no fee to the Contractor.

SECTION 3 - CONTROL OF THE WORK

3-7 CONTRACT DOCUMENTS.

3-7.1 General. – *Add the following paragraphs:*
Contractor's working drawings or plans for any structure not included in the plans shall be approved by the Engineer before any work is performed. It is mutually agreed that approval by the Engineer of the Contractor's working plans does not relieve the Contractor of any responsibility for accuracy of dimensions and details, and that the Contractor shall be responsible for agreement and conformity of their working plans with the approved plans and specifications.

Finished surfaces in all cases shall conform with the lines, grades, cross sections, and dimensions shown on the approved plans. Deviations from the approved plans will be determined by the Engineer and approved in writing. In the event of a discrepancy between any drawing and the figures written thereon, the figures shall be taken as correct.

Should it appear that the work to be done or any matter thereto is not sufficiently detailed or explained by the plans and specification, the Contractor shall apply to the Engineer for such further explanation as may be necessary and shall conform to such explanation or interpretation as part of the Contract so far as may be consistent with the intent of the original plans and specifications.

3-7.1.1 Preconstruction Meeting. The Contractor to whom the contract is awarded, and all his major subcontractors, shall attend a pre-construction meeting. The time and location of said meeting will be set by the City. Contractor will be given adequate notice of such meeting. It shall be the Contractor's responsibility to notify his subcontractors of the time and location of the meeting. All submittals as required under the General Requirements shall be submitted by the Contractor at the time of the meeting.

The Contractor will be provided with an electronic (.PDF file) of the conformed plans and specifications for their use throughout the project. Contractor is responsible for all costs of reproduction.

Progress meetings will be scheduled by the City. The Contractor will be given at least five working days notice of the time and location of said meetings. The Contractor has the responsibility of notifying his subcontractors, suppliers, and fabricators of the time and location of said meetings. Meetings will be held either at the job site, at the offices of the City of Redlands, or at any other

location approved by the City. The Contractor may request, in writing, that a meeting be held. The City will schedule a meeting at the Contractor's request not more than five working days after receiving said written notice.

3-7.2 Precedence of Contract Documents. – *Replace paragraph 2 with the following:*
The precedence shall be (A. being highest, O. being lowest):

A. Permits from other Agencies as may be required by law.
B. Change Orders.
C. Contract.
D. Addenda.
E. Bid Schedule/Proposal.
F. General Requirements.
G. Technical Specifications.
H. Plans.
I. MUED General Permit Conditions and Trench Specifications.
J. City of Redlands Water & Sewer Systems Standard Specifications.
K. General Conditions.
L. City of Redlands Standard Specifications and Detail Drawings for Design and Construction of Public Improvements and all Supplements
M. Standard Specifications for Public Works Construction (SSPWC), 2018 Edition
N. Standard Plans for Public Works Construction, 2012 Edition
O. Reference Specifications.

3-8.7 Record Drawings. The Contractor shall maintain at the job site, a set of record drawings for the work showing: exact location information of all existing underground utilities encountered, final locations determined in the field, any deviations from the plans and specifications and new work performed within the work area; and all differences between the work as drawn and as installed for all concealed work as well as work added which is not shown on the drawings. Concealed work shall mean all work installed underground or in an area which cannot be readily inspected by use of access panels, inspection plates or other removable features. When vacuum excavation (potholing) services are required, contractor to provide report that identifies depth and alignment of underground utilities.

These record drawings shall be kept current and legible, and shall be available for inspection at all times by the Engineer, Architect and Contractor. All information, changes in the work or work added on these record drawings shall be marked in red. All markings shall use the same legends that are used on the drawings. Indicate locations by exact dimensions and elevations. Give dimensions and elevations from a permanent reference point and prepare all changes to scale.

At the end of construction, the contractor shall prepare one set of marked-up prints of the record drawings indicating any and all revisions and changes to the drawings reflecting As-Built conditions. The drawings shall also contain a listing of all subcontractors who worked on the construction project. The As-Built drawings will be submitted to the Municipal Utilities and Engineering Department for review and approval by the City Inspector and Engineer.
The design engineer or City staff shall prepare the final As-Built drawings for record purposes in one of the following two ways: (1) Check out the original drawings from the City and manually revise the

drawings to reflect the As-Built condition; or (2) Re-plot the original drawings electronically on 4 mil mylars and make revisions electronically to reflect the As-Built conditions. The final As-Built drawings will be reviewed and approved by the City Inspector and Engineer

The construction related bonds will not be released by the City until the As-Built drawings are accepted by the Engineer and all City stipulated conditions for the release of the bonds have been satisfied.

3-10 SURVEYING.

3-10.3 Line and Grade. - *Add the following sentences to paragraph 1:*
All distances and measurements shown are and will be made in a horizontal plane. Construction line and grade staking shall be set at maximum intervals of 25 feet when the grade is 0.50 percent or greater. Construction line and grade staking shall be set at maximum intervals of 12 feet when the grade is less than 0.50 percent.

3-10.4 Permanent Survey Markers.
The Registered (licensed) Land Surveyor or Registered Civil Engineer authorized to practice land surveying in accordance with all provisions of Section 8771 of the Business and Profession Code shall be hired as a subcontractor or employed by the Contractor.

3-10.5 Survey Service.
Contractor shall be responsible for: furnishing all surveying and staking, horizontal and vertical, as shown on the plans and in accordance with the specifications; furnishing all staking for sub-grade and base course grades per typical sections; replacing any existing monuments and ties which have been destroyed by construction; identifying, locating and tying out all monuments and ties necessary within the work area; and shall reinstall all disturbed monuments and ties, supplying the Engineer with copies of monument and tie sheets recorded with the County Surveyor in accordance with applicable State law. Monuments shall be approved by the Engineer.

Surveying and staking shall be done by a Registered (licensed) Land Surveyor or Registered Civil Engineer authorized to practice land surveying in accordance with all provisions of Section 8771 of the Business and Professions Code.

Unless otherwise specified, stakes will be set and stationed by the Contractor's surveyor for curbs, headers, sewers, storm drains, structures, rough grade and all other staking necessary for the construction of the work. A corresponding cut or fill to finished grade (or flowline) will be indicated on a grade sheet to be supplied to the Engineer. The Contractor shall dig all holes necessary for line and grade stakes.

3-13 COMPLETION, ACCEPTANCE, AND WARRANTY.

3-13.2 Acceptance. - *Add the following paragraphs:*
The Contractor shall submit written assertion that the work has been completed prior to the Engineer making final inspection. The Engineer will have 48 hours to inspect the work. If the Engineer determines that the work is not complete, written notice will be given.

Until final acceptance of work by the Engineer, the Contractor shall have charge and care thereof from damage caused by the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore, and make good all injuries or damage to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof.

All work which has been rejected shall be remedied or removed and replaced by the Contractor at their expense with work conforming to the plans and specifications. Any defective material or workmanship which may be discovered before final acceptance or within one year from the date of final acceptance shall be immediately corrected by the Contractor at their expense, notwithstanding that it may have been overlooked in previous inspections and estimates. Failure to inspect work at any stage shall not relieve the Contractor from any obligation to perform sound and reliable work as herein described. It is the Contractor's ultimate responsibility to deliver a complete, operational project that complies in all details with these specifications, at the time of final acceptance.

Any omission or failure on the part of the City to discover or notify the Contractor of or to condemn defective work or material at the time of construction shall not be deemed as acceptance, and the Contractor will be required to correct defective work or material prior to final acceptance.

The City will endeavor to locate any errors or defective materials or workmanship and call them to the attention of the Contractor prior to subsequent work being performed. However, the City is under no obligation to do so and shall not be held liable because errors or defective material or workmanship by the Contractor are not discovered prior to subsequent work.

Nothing in this section shall be construed to limit the rights of the City to immediately correct conditions which are unsafe or which pose a public health nuisance. Should said corrections later be found to be caused by defective material and/or workmanship, the Contractor and their surety shall reimburse the City for costs reasonably incurred while attending the situation.

In the event it is necessary for the City to file suit to enforce any liability of the Contractor pursuant to this Section, the City shall be entitled to recover from the Contractor, in addition to all other amounts found due and owing, costs of suit and reasonable expenses and fees including reasonable attorneys' fees incurred by the City in successfully enforcing the Contractor's obligation, all to be taxed as costs and included in any judgment rendered.

3-13.3 Warranty. - *Amend the following:*

Amend the first sentence of the paragraph 3:
"The warranty period for specific items covered under manufacturers' or suppliers' warranties shall commence from the date of the final acceptance, except where longer warranty periods are specified."

Add the following paragraphs:
All start-up and testing shall be complete, approved and accepted before final acceptance, substantial completion, or beneficial occupancy.

The warranty provided herein shall not be in lieu of, but shall be in addition to any warranties or other obligations otherwise imposed by the specifications or by law. The remedies provided herein shall not be exclusive and the City shall be entitled to any and all remedies provided by law.

3-14 INSPECTION.

The Contractor shall notify the Engineer at least 24 hours in advance before inspection is required. Whenever the Contractor varies the period during which work is carried on each day, due notice shall be given to the Engineer so that proper inspection may be provided. Varied working hours may be allowed only upon written authorization from the Engineer.

Work financed in whole or in part with funds from another public entity or performed within the jurisdiction of another public entity shall be subject to inspection at all times by authorized representatives of that entity.

The work shall be ready for inspection, whether by City, other public entities or independent testing laboratories, at the scheduled times arranged by the Contractor. If, in the City's sole judgment, the work is not ready and the inspection must be rescheduled, the Contractor shall be notified. The Contractor shall reschedule the inspection and provide the proper 24 hour notification for the rescheduled inspection. Any costs incurred by the City for rescheduled inspections shall be reimbursed prior to the release of Bonds.

In order to allow for inspection, the Contractor shall notify the City's inspector sufficiently in advance of the permanent concealment of any materials or work. The City's inspector shall make the appropriate notifications to other public entities and independent testing laboratories for inspections. All inspections required in the specifications for this project shall be coordinated through the City's inspector.

If any work is concealed or performed without the prior notice specified, the work shall be subject to such tests or exposure as may be necessary to prove to the City, Architect and Engineer, that the materials used and the work performed are in conformity with the drawings and specifications. All labor, tools, materials and equipment necessary for exposing and testing shall be furnished by the Contractor at their expense. The Contractor shall replace at their expense, any materials or work damaged by exposure or testing.

Overtime inspection may be requested by the Contractor. Overtime inspection includes but is not limited to, any hours worked outside of the inspector's normal working hours including weekends and holidays. Such requests shall be on a case-by-case basis as determined by the Engineer. If the Engineer so determines and approves, overtime inspection shall be paid for by the Contractor at the current City billing rate at the time of request or as billed by other public entities or independent testing laboratories. Any costs incurred by the City for overtime inspection shall be reimbursed prior to the release of Bonds.

SECTION 4 - CONTROL OF MATERIALS

4-1 GENERAL. - *Delete and replace with the following:*

Should any work performed or material furnished under the Contract prove defective or not in accordance with the Plans and Specifications and in the opinion of the Engineer such defect is not of sufficient magnitude or importance to make the work dangerous or unusable, or if the removal of such work is impracticable or will create dangerous or undesirable conditions, the Engineer at his discretion shall have the right and authority to retain such work instead of requiring it to be removed and reconstructed, but he shall make such deductions therefore in the payment due the Contractor as may be just and reasonable.

4-1.1 Warranty of Title. No materials, supplies or equipment for the work under this Contract shall be purchased subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest therein or any part thereof is retained by the seller or supplier. The Contractor warrants clear and good title to all materials supplied and equipment installed and incorporated in the work and agrees, upon completion of all work, to deliver the premises, together with all improvements and appurtenances constructed or placed thereon by him, to the Owner free from any claims, liens, encumbrances or charges, and further agrees that neither he nor any person, firm, or corporation furnishing any material or labor for work covered by the Contract shall have any right to a lien upon the premises or any improvement or appurtenance thereon, provided that this shall not preclude the Contractor from installing metering devices or other equipment of utility companies the title of which is commonly retained by the utility company. Nothing contained in this article, however, shall defeat or impair the right of such persons furnishing materials or labor under any bond given by the Contractor for their protection, or any right under any law permitting such persons to look to funds due the Contractor, which are in the hands of the Owner.

4-1.2 Clayton Act. In submitting a bid to the City, if the bid is accepted the Contractor agrees it will assign to the City all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Section 15) or under the Cartwright Act (chapter 2 [commencing with Section 16700] of Part 2 Division 7 of the Business and Professionals Code), arising from purchases of goods, materials, or services by the Bidder for sale to the City pursuant to the bid. Such assignment shall be made and become effective at the time the City tenders final payment to the Bidder.

SECTION 5 – LEGAL RELATIONS AND RESPONSIBILITES

5-1.1 CONTRACTOR'S EQUIPMENT AND FACILITIES.

A noise level limit of 86 dbA at a distance of 15 m (50 feet) shall apply to all construction equipment on or related to the work whether owned by the Contractor or not. The use of excessively loud warning signals shall be avoided, except in those cases required for the protection of personnel.

5-1.2 General.

The enclosed toilets required by this section shall be located within an approved yard, if one is acquired by the Contractor. If a yard is not acquired by the Contractor or the project is not within a City owned property, the toilets must be installed on a trailer and removed from the jobsite each day. At no times shall toilets be stored within the public right of way outside of working hours.

5-3 LABOR. - *Amend the following:*

5-3.1 General. - *Add the following paragraphs:*
Employment of apprentices are required on projects of $30,000 or more. Provisions in Sections 1777.5 of the California Labor Code fixes responsibility of compliance with that section for all apprenticeable occupations with the Contractor. Section 1777.5 provides that the Contractor and every Subcontractor shall submit contract award information to the applicable joint apprenticeship committee. One apprentice hour for every five journeymen hours worked is the minimum State requirement applicable to each apprenticeable trade. Section 1777.7 of said Labor Code provides that the Contractor shall forfeit as a civil penalty the sum of one hundred dollars ($100.00) for each calendar day of noncompliance with provision of said Section 1777.5.

The Contractor will observe all applicable health and safety requirements, including, but not limited to the California and Federal Occupational Safety and Health Acts. The Contractor shall submit for review by the City a Site Specific Health and Safety Plan prior to the commencement of construction activities. This Plan shall meet or exceed the requirements of 29 CFR 1910.120.

5-3.2 Prevailing Wages. - *Add the following paragraphs:*
Contractors are hereby notified that pursuant to Section 1770 of the Labor Code of the State of California, the City Council of the City of Redlands, California, by Resolution No. 2326, has ascertained the general prevailing rate of hourly wages and rates for legal holidays and overtime work in the locality where this work is to be performed, for each craft or type of workman or mechanic needed to execute the Contract which will be awarded to the successful Bidder. The Contractor shall comply with Sections 1770 to 1780 inclusive of the Labor Code and Master Labor Agreement of Southern California.

The Contractor and each of his subcontractors shall pay each of his employees engaged in work on the project under this Contract in full less legally required deductions and also deductions made pursuant to the regulations prescribed under the so-called "Kick- Back Statute" (48 Sta. 948; U.S.C. 875; 40 U.S.C. 276c).

In accordance with Section 1775 of the California Labor code, Contractor shall forfeit to City, as a penalty, a minimum of $40 for each day, or portion thereof, and a maximum of $200 for each day, or portion thereof, for each worker paid, either by Contractor, or any subcontractor, less than the prevailing rates as determined by the Director of the California Department of Industrial Relations for the work.

Contractor further agrees to fully comply with all applicable provisions of the California Labor Code including but not limited to Sections 1771, 1775, 1776, 1777.5, 1813 and 1815. Failure to abide by prevailing wages and laws by Contractor will be enforced.

The Contractor or subcontractor shall, as a penalty, to the State or political subdivision on whose behalf the contract is made or awarded forfeit twenty-five ($25) dollars for each worker employed in the execution of the contract by the respective contractor or subcontractor for each calendar day during which the worker is required or permitted to work more than 8 hours in any calendar day and 40 hours in any calendar work in violation of Labor Code section 1813.

5-3.3 Payroll Records. – *Delete and replace with the following*:

The contractor and subcontractors shall submit electronic certified payroll on a weekly basis to the City of Redlands through LCPtracker. LCPtracker is a web-based labor compliance management system. The Prime Contractor and Subcontractors and lower-tier Subcontractors will receive an email from LCPtracker providing their log-on identification and temporary password. The Contractors will need to follow the instructions in the email to set-up their permanent password and activate their account. Once their account is setup, LCPtracker Inc. provides either computer based or web based training. Training can be accessed via the "Book Now" button located under the "Projects" tab. The prime contractor shall submit their certified payroll, along with any subcontractor who is performing any labor, on a weekly basis. The prime contractor is responsible for all communication with their subcontractors and shall submit their subcontractor's certified payroll as part of their weekly payroll packet. All labor compliance correspondence and submissions will be made through the LCPtracker software.

All certified payroll shall be submitted no later than 7 days from the close of the pay period. The payroll records shall set out accurately and completely the name, social security number, classification and hourly wage rate of each employee, hours worked by employee during the payroll period and a full weekly wages and the actual weekly wages paid to the employee. Such certified payroll records shall be made available at all time for inspection by the City, the Department of Industrial Relations, the Department of Labor or authorized representatives within ten days of request. The contractor and subcontractor shall preserve weekly payroll records for a period of three (3) years from the date of completion of the Contract. In case on noncompliance with said Section 1776 and after a ten-day period following receipt of written notice, the Contractor shall forfeit to the California Department of Industrial Relations one hundred dollars ($100.00) for each calendar day or portion thereof, for each worker in non-compliance, until compliance is effectuated.

In order to meet labor compliance requirements, all contractors will be required to complete eDocuments which are accessed, submitted and approved through LCPtracker. All eDocuments are required to be signed by an owner/officer or authorized signer. The Prime Contractor and each Subcontractor and every lower-tier Subcontractor and any Vendors subject to this provision shall comply with Title 8, Section 16404 of the California Code of Regulations.

A Fringe Benefit Statement shall be submitted with the first payroll and is required for both the prime contractor and any subcontractors. A new Fringe Benefit Statement will be required when general determinations are issued in February and August. Please refer to the DIR website for additional details. Any weeks where no work was performed must be represented by the submittal of a Statement of Non-Performance covering the 7 day pay period where no hours were worked on the site. Final payroll on the project should state "Final" on the certified payroll, and must be marked as such in the LCPtracker system.

Failure by the Contractor to comply with the aforementioned requirements shall result in withheld progress payments until such time certified payroll documents have been received, reviewed, and accepted by the City. The City reserves the right to seek assistance from the State Department of Industrial Relations in determining the acceptability of certified payroll submittals before release of withheld progress payments. Prior to the release of retention monies, all certified payroll must be submitted on the project and any outstanding issues that may have occurred throughout the project must be resolved.

5-4 INSURANCE. - *Delete Section 5-4.1, Section 5-4.2 and replace with the following:*
Before entering into a Contract, the Bidder to whom the Contract has been awarded shall furnish satisfactory evidence that they have secured all required insurance from a responsible insurance company authorized to do business in California and satisfactory to the City, and such insurance shall be maintained in full force and effect at the Contractor's own expense during the life of the Contract. Contractor shall furnish the City with the customary Certificates of Insurance for all required insurance listed below. General Liability Insurance shall name the City and the Consultant, as an additional insured and shall be primary and non-contributing to any insurance or self-insurance maintained by the City. All liability insurance policies shall bear an endorsement or shall have attached a rider whereby it is provided that, in the event of expiration or proposed cancellation of such policies for any reason whatsoever, the City shall be notified by registered mail, return receipt requested, giving sufficient time before the date thereof to comply with any applicable law or statute, but in no event less than forty five (45) days before expiration or cancellation is effective.

The coverage shall provide the following minimum limits based on the type of work proposed under this Contract. The Contractor shall determine if the proposed work requires Tier 1 or Tier 2 Designated Insurance Requirements shown below.

CONTRACTED OPERATIONS DESIGNATED AS TIER 1		
Air Conditioning (HVAC) Systems (installation)	Electric Light or Power Line Construction	Pipeline Construction
Airport Runways (paving, repaving, etc.)	Elevator Work	Roofing
Blasting Operations	Excavation	Sandblasting
Bridge or Elevated Highway Construction	Fire Suppression Systems (installation)	Sewer and Water Main Construction
Buildings Structural Work (including elevators)	Gas Mains or Connections Construction	Sign Erection (streets)
Building Structure (raising or moving)	Geophysical Exploration	Solar Energy
Cable Installation in Conduits and Conduit Construction (streets)	Grading of Land	Street Cleaning
Caisson or Cofferdam Work	Hazardous Materials Contractors	Street or Road Construction
Dam or Reservoir Construction	Irrigation or Drainage Construction	Tank Construction, Installation, Erection or Repair
Demolition (structures)	Landscape Construction (street or street medians)	Telephone or Cable Line Construction
Drilling	Painting (exterior greater than single story)	Tree Pruning, Dusting, Spraying or Removal

TIER 1 DESIGNATED INSURANCE REQUIREMENTS

a. Commercial General Liability
   - $1 Million Per Occurrence/ $2 Million Aggregate
     - City listed as an Additional Insured on the coverage
     - Coverage is primary and non-contributory

- If scope of work is within 50 feet of any railroad, endorsement citing inclusion of liability associated with this work is required
- If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission

b. Business Auto Liability
   - $1 Million Combined Single Limit
     - City listed as an Additional Insured on the coverage
     - Must include liability arising from all owned, leased, hired, and non-owned autos
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission
   - If Contractor or its subcontractors or suppliers haul hazardous material (including, without limitation, waste), Auto Liability insurance must be applicable to all hazardous waste hauling vehicles, and include MCS 90 and CA9948 Endorsements.

c. Commercial Umbrella/ Excess Liability
   - $5 Million Per Occurrence/ Aggregate
     - City listed as an Additional Insured on the coverage
     - Coverage is primary and non-contributory
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission

d. Workers Compensation
   - $1 Million Per Occurrence for Bodily Injury by Accident
   - $1 Million Each Employee for Bodily Injury by Disease
   - $1 Million Policy Limit for Bodily Injury by Accident
     - Waiver of Subrogation in favor of City
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission

e. Pollution Policy (Hazardous Materials) [If Applicable]
   - Required of Projects that involve Demolition and/or Excavation Activities
   - $1 Million Per Occurrence/ $2 Million Aggregate
   - City listed as an Additional Insured on the coverage

CONTRACTED OPERATIONS DESIGNATED AS TIER 2		
Air Conditioning (HVAC) Systems (service and repair)	Carpentry (building interiors)	Fire Suppression Systems (service and repair)
Alarms and Alarm Systems	Communications Equipment Installation (interior)	Landscape Construction
Building Interior Work (service, repair and non-structural remodeling)	Driveway, Parking Area or Sidewalk (paving or repaving)	Painting (exterior)
Cable Installation in Conduits (buildings)	Fence Erection	All Other Job Types including Vendors

TIER 2 DESIGNATED INSURANCE REQUIREMENTS

a. Commercial General Liability
   - $1 Million Per Occurrence/ $2 Million Aggregate
     - City listed as an Additional Insured on the coverage
     - Coverage is primary and non-contributory
     - If scope of work is within 50 feet of any railroad, endorsement citing inclusion of liability associated with this work is required
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission

b. Business Auto Liability
   - $1 Million Combined Single Limit
     - City listed as an Additional Insured on the coverage
     - Must include liability arising from all owned, leased, hired, and non-owned autos
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission
   - If Contractor or its subcontractors or suppliers haul hazardous material (including, without limitation, waste), Auto Liability insurance must be applicable to all hazardous waste hauling vehicles, and include MCS 90 and CA9948 Endorsements.

c. Workers Compensation
   - $1 Million Per Occurrence for Bodily Injury by Accident
   - $1 Million Each Employee for Bodily Injury by Disease
   - $1 Million Policy Limit for Bodily Injury by Accident
     - Waiver of Subrogation in favor of City
     - If any policy forms of endorsements are cited to grant extension of coverage, they must be included with the Certificate of Insurance submission

d. Pollution Policy (Hazardous Materials) [If Applicable]
   - Required of Projects that involve Demolition and/or Excavation Activities
   - $1 Million Per Occurrence/ $2 Million Aggregate
   - City listed as an Additional Insured on the coverage

Contractor expressly waives all rights to subrogation against the City, its officers, employees and volunteers for losses arising from work performed by Contractor for City by expressly waiving Contractor's immunity for injuries to Contractor's employees and agrees that the obligation to indemnify, defend and hold harmless provided for in this Agreement extend to any claim brought by or on behalf of any employee of Contractor. This waiver is mutually negotiated by the parties. This shall not apply to any damage resulting from the sole negligence of City, its agents and employees. To the extent any of the damages referenced herein were caused by or resulted from the concurrent negligence of City, its agents or employees, the obligations provided herein to indemnify, defend and hold harmless are valid and enforceable only to the extent of the negligence of contractor, its officers, agents and employees.

Subcontractors. The prime contractor shall include all subcontractors as insureds under its policies or shall furnish separate certificates and endorsements from each subcontractor.

The Contractor shall not assign or sublet the contract, in whole or in part, without the written consent of the City, nor shall the contractor assign any monies due to, or to become due to, Contractor hereunder without prior written consent of the City.

The Contractor shall be fully responsible to the City for the acts and omissions of the subcontractor and persons either directly or indirectly employed by the Contractor. Consent to subcontracting part of the work shall, in no way, release the Contractor from responsibility for performance of the work, and Contractor will be held, in all respects, accountable for the same as if no consent had been given. The Contractor shall give personal attention to this work which is sublet. Nothing contained in the contract documents shall create any contractual relation between any subcontractor and the City.

Hold Harmless and Indemnification. Contractor shall indemnify, hold harmless and defend City and its elected officials, agents and employees and the Consultant from and against any and all claims, losses or liability, including attorney's fees, arising from injury or death to persons or damage to property occasioned by any act, omission or failure to act of Contractor, its subcontractors, and any officers, agents and employees in performing the work required by this Agreement. Contractor's obligations under this provision shall not be limited in any way by any terms of this Agreement, or the insurance limits.

5-4.3 Worker's Compensation Insurance. - *Delete and replace with the following:*

A. Contractor shall have worker's compensation and employer's liability insurance in force throughout the duration of the contract in an amount which meets the statutory requirement with an insurance carrier acceptable to the City. The insurance policy shall include a provision prohibiting cancellation of said policy except upon forty-five (45) days prior written notice to City. Certificates of Insurance shall be delivered to the City at the time of the Contractors' execution of the agreement.

B. Contractor expressly waives all rights to subrogation against the City, its officers, employees and volunteers for losses arising from work performed by Contractor for City by expressly waiving Contractor's immunity for injuries to Contractor's employees and agrees that the obligation to indemnify, defend and hold harmless provided for in this Agreement extend to any claim brought by or on behalf of any employee of Contractor. This waiver is mutually negotiated by the parties. This shall not apply to any damage resulting from the sole negligence of City, its agents and employees. To the extent any of the damages referenced herein were caused by or resulted from the concurrent negligence of City, its agents or employees, the obligations provided herein to indemnify, defend and hold harmless are valid and enforceable only to the extent of the negligence of contractor, its officers, agents and employees.

5-6 PATENT FEES OR ROYALTIES. *Delete and replace with the following:*
The Contractor shall include in its Bid the patent fees or royalties on any patented article or process which may be furnished or used in the Work. The Contractor shall indemnify and hold the City

harmless from any legal action that may be brought for infringement of patents. The Contractor's attention is directed to "Notice of Patents, Data, and Copyright Regulations" of the Federal Labor Standards.

The Contractor shall bear all costs arising from the use of patented goods and/or processes used on and/or incorporated into the Work. When use of these goods and/or processes is judged to be an infringement and the use is banned, the Contractor, at its own expense, shall, with concurrence of the Engineer, do one of the following:

A. Secure for the City the right to continue using goods and/or processes by suspension of the injunction or by procuring a license(s);

B. Replace said goods and/or processes with non-infringing goods and/or processes;

C. Modify said goods and/or processes so that they become non-infringing; or

D. Remove said goods and/or processes and refund the sum paid therefore without prejudice to any other rights of the City.

The preceding shall not apply to any goods manufactured to the detailed design of the City contained in the Contract Documents.

5-7 SAFETY.

5-7.1 Work Site Safety.

5-7.1.1 General. - *Amend the following:*

Add the following sentences to paragraph 1:
Should watering be the sole method utilized for roadway dust abatement purposes, the maximum time interval that shall elapse between applications thereof shall be no greater than 3 hours during normal working day, supplemented by an additional application thereof immediately prior to the conclusion of the workday and at such other times as may be required, including evenings, weekends and holidays as required by the Engineer. Should the Contractor be unable to furnish dust abatement as specified, the City may perform or cause to be performed the necessary service, the expense of which will be deducted from the payment due the Contractor.

Add the following paragraphs:
To insure the protection of storm drain inlets, Best Management Practices (BMPs) shall be employed during cleanup and dust control operations. Refer to Section 7-8.6.

Compliance with this section is of extreme importance to the City and its citizens. The City may fine the Contractor $1,000 per incident if there are issues with dust, mud, unused equipment or materials and rubbish within the construction area that result in citizen complaints. A 24 hour notice shall be issued to the Contractor and failure to correct the problems will result in the fine being levied. This fine will be in addition to those fines potentially charged for NPDES violations.

5-8 AIR POLLUTION CONTROL.

Dust control shall be performed in accordance with Subsection 7-8 of the Standard Specifications, South Coast Air Quality Management District (SCAQMD) Rule 403, the general Provisions and the following Provision.

Dust resulting from the Contractor's performance of the work, either inside or outside, the right-of-way shall be controlled by the Contractor. Dust control includes the action necessary to prevent, reduce or control dust within the work area as required to complete the work. The Contractor shall carry out proper and efficient measures to prevent his operations from producing dust in amounts damaging to property or causing a nuisance, or harm to persons living nearby or occupying buildings in the vicinity of the work. The Contractor shall control dust 24 hours a day, seven days a week. The methods to be used for controlling dust in the construction area and along haul roads shall be approved by the Engineer prior to starting any work. The Rule 403 Implementation Handbook published by the SCAQMD, contains a detailed listing of reasonably available dust control measures.

Dust control ordered by the Engineer to be applied on Saturdays, Sundays or holidays will be included in the Contract price for dust control and no additional compensation will be allowed therefore.

The full compensation for all direct and indirect costs incurred for work performed or materials used to control dust resulting from the Contractor's performance of the work and caused by public traffic, either inside or outside the right-of-way shall be considered as included in the Contract prices paid for the various items of work involved and no additional compensation will be allowed therefore.

5-9 STORAGE OF EQUIPMENT AND MATERIALS.

The Contractor shall be required to provide and maintain as necessary, any additional property required for storage of equipment, materials, etc., to perform work on this project. Should the additional property be located within the city limits of the City of Redlands, the Contractor shall obtain written approval from the City of Redlands Development Services Department and comply with all conditions set therein prior to use. When private property is used for a yard area, the Contractor shall also secure written authorization from the private property owner and supply a copy of such to the City before any monthly progress payment is submitted. Contractor to propose designated areas of the project site, upon approval by the Engineer, suitable for material delivery, storage, and waste collection.

The Contractor shall ensure the construction yard adheres to all local, State and Federal regulations, ordinances, codes and maintained in a neat and orderly manner throughout the duration of the project. The contractor shall include the construction yard in the Erosion Control Plan or SWPPP and shall be inspected and approved prior to use of the yard. If at any time during the project the location of the construction yard changes from the approved site, the City shall be notified prior to relocation for inspection and approval. Should the Contractor fail to comply with these conditions, the Engineer may suspend the work per SSPWC section 6-3 until the condition is corrected.

At the end of the project or as required, the Contractor shall: clean up and remove all trash and debris, including all organic trash and debris; clean up and remove all hazardous and biochemical wastes from the property to the satisfaction of the agency (City, County, State, or Federal) charged with overseeing these items; and provide to the City a written release from the private property owner that they are satisfied with all clean up and removal work.

5-9.1 Storage in Public Streets.
Construction materials and equipment shall not be stored within public streets or right of way without prior approval from the City. In order to seek approval, Contractor shall submit a location map with all equipment or materials identified including size, duration and any BMP's installed and provide at least 7 days for review by the City.

5-10 WATER POLLUTION CONTROL.

The Contractor shall follow the City's guidelines for Storm Water Pollution Prevention in providing storm water pollution control at the project site, including the implementation of approved Erosion/Sediment Control Plans during construction as well as the implementation of approved Water Quality Management Plans.

Construction activities disturbing 1 acre or more of land shall comply with the State Water Resources Control Board's NPDES General Construction Storm Water Permit. A copy of the Notice of Intent (NOI) to include the Waste Discharge Identification (WDID) number shall be submitted as part of the Storm Water Pollution Prevention Plan (SWPPP) to the Engineer for review. Call (909) 782-4130 for NOI/WDID information.

All projects requiring grading shall submit to the City for review and approval an Erosion/Sediment Control Plan and a Grading Plan. Permit(s) will not be issued until plans are approved and may be revoked if work required in these specifications are not complied with.

Construction sites shall be maintained by implementation of BMPs in such manner that pollutants are not discharged from the site to the maximum extent practicable. A few references available to help with selection and implementation of applicable BMPs are:

1. California Storm Water Best Management Practice Handbook, American Public Works Association, March 1993;
2. The Construction Site Best Management Practices Manual, November 2000;
3. Storm Water Pollution Prevention Plan and Water Pollution Control Program Preparation Manual, November 2000;
4. California Regional Water Quality Control Board's San Francisco Bay Region, Guidelines for Construction Projects; and
5. California Regional Water Quality Control Board's San Francisco Bay Region, Erosion and Sediment Control Field Manual, July 1999.

All discharges into the storm drain system are prohibited except for potable water, properly treated discharge, and those discharges specifically approved by the Engineer. The following are some of the prohibited discharges:

1. Discharges that could have an impact on human health or the environment, cause or threaten to cause pollution, contamination, or nuisance;
2. Discharges that exceed any applicable water quality standard contained in a statewide Water Quality Control Plan or local Basin Plan; and
3. Discharges containing hazardous substances equal to or in excess of a reportable quantity listed in Federal regulations 40 CFR, Parts 117 and 302.

Materials that can cause or contribute to pollution or a violation of any applicable water quality standard include, but are not limited to: sediments; solid or liquid chemical spills; wastes from paints, stains, sealants, glues, limes, pesticides or herbicides and wood preservatives or solvents; asbestos fibers, paint flakes or stucco fragments; fuels, oils, lubricants or hydraulic, radiator and battery fluids; fertilizers; vehicle and equipment wash water or concrete wash water; concrete, detergent or floatable wastes; wastes from any engine and equipment steam cleaning or chemical degreasing; and chlorinated potable water line flushings.

Unless exempted or authorized by an NPDES permit, all non-storm water discharges require prior approval by the Engineer or the State Water Resources Control Board with Engineer approval.

During construction, temporary storage of such materials as identified above, must occur in a designated area physically separated from potential storm water runoff, with ultimate disposal in accordance with local, state and federal requirements.

De-watering of contaminated groundwater or discharging contaminated soils via surface erosion is prohibited.

Unless indicated otherwise by the Engineer, all projects, regardless of size, shall submit for review and approval, a Water Quality Management Plan (WQMP). The WQMP shall consist of post construction BMPs which shall remain in effect throughout the life of the facility. Refer to WQMP guidelines.

5-11 TEMPORARY LIGHTS, POWER AND WATER.

Any water drawn from a City fire hydrant shall be via a City owned water meter. Said meter may be obtained from the Municipal Utilities & Engineering Department. Contractor is responsible for payment of a $1200 deposit fee. Said meter shall be returned in a condition like received, less normal wear and tear. All meters are loaned subject to the conditions of the Fire Hydrant Construction Meter Water Service Application. Contractor must provide proposed location of meter and notify Customer Service at (909) 798-7516 each time the meter is relocated during construction. Water reasonably used in connection with the construction contract will be provided at no cost to the Contractor. Water use determined to be wasteful or unreasonable will be charged for at the prevailing rate.

5-12 PROTECTION AND RESTORATION OF EXISTING IMPROVEMENTS.

The Contractor shall relocate, re-establish, repair or replace all existing improvements within the work limits or right-of-way which are not designated for removal (e.g., sprinkler systems, curbs, sidewalks, driveways, fences, walls, signs, utility installations, pavement, structures, etc.) which are damaged or removed as a result of its operations.

Relocations, re-establishments, repairs and replacements shall be at least equal to existing improvements and shall match them in finish and dimension.

All costs to the Contractor for protecting, removing, restoring, relocating, repairing, replacing or re-establishing existing improvements shall be included in the Bid.

The Contractor shall be responsible for the maintenance of the streets and roadways to be used by public and local traffic through and adjacent to the construction zone, from the date of "Notice to Proceed" until the date of acceptance of the completed construction improvements.

Street maintenance shall include filling of potholes, grading of subgrade and base, replacing signs, installing interim pavement striping and markers on the project streets and other side streets within the construction zone. Street maintenance shall also include sweeping and washing of streets, adjacent and connected to the construction zone on a weekly, or more frequent schedule, to prevent the accumulation of dust, dirt, gravel or other deleterious materials, all as necessary to maintain the construction roadways and adjacent streets in a safe, clean and drivable condition for use by public and local traffic.

Upon request from the City for information pertaining to a claim against the contractor, contractor shall provide a written/email response, including all requested information, within 14 calendar days of City's request. If a response with all requested information is not provided to the City within 14 calendar days, a penalty of $500 per calendar day will be assessed to the Contractor by the City.

5-13 PUBLIC CONVENIENCE AND SAFETY.

5-13.1 General.

The Contractor may be allowed to close the roadway, or a portion thereof, to traffic during normal work hours upon approval from the Engineer. During any closure, the Contractor shall allow access for residents, schools, trash service trucks, churches and businesses within the affected portion of roadway, except as required for construction for a reasonable period of time. The Contractor shall notify residents as noted within Section 5-18.

The Contractor shall provide and install barricades, delineators, warning devices and construction signs in accordance with the Work Area Traffic Control Handbook (WATCH) prepared by the Southern California Chapter of the American Public Works Association. During adverse weather or unusual traffic or working conditions additional devices shall be placed as directed by the engineer. All traffic signs and devices shall conform to the current State of California, Department of Transportation (CALTRANS), "Manual of Warning Signs, Lights, and Devices for Use in Performance of Work upon Highways", unless otherwise approved by the Engineer.

Fences, barriers, lights and signs shall be furnished, erected and maintained as necessary to give an adequate warning to the public at all times that the work is under construction and of dangerous conditions to be encountered as a result thereof, and warning and directional signs shall also be erected and maintained as may be required by the City. Should the Contractor fail to furnish a sufficient number of traffic and/or pedestrian safety devices within three (3) hours after being notified, the Owner will place such necessary items and the Contractor shall be liable to the Owner for providing such devices in accordance with the following provisions:

1. For placing of barricades - $15.00 per barricade for each day or part thereof.

   For flashers - $15.00 per flasher for each day or part thereof.

   For traffic cones - $7.50 per cone for each day or part thereof.

2. In the event that the services of the Owner are required outside the normal working hours and/or days or items not noted above are furnished by the City, all costs incurred by the City shall be the responsibility of the Contractor.

The Contractor shall relocate, preserve and maintain the visibility of all signs within the project limits which affect the flow of traffic, as directed by the engineer. Any signs that are missing or found damaged shall be replaced immediately by the Contractor at his expense.

The Contractor shall provide and maintain Class II barricades along excavation edges parallel to the flow of traffic at a spacing of twenty-five feet (25'). Class II barricades mounted with flashers shall be installed around work areas in parkways. Class II barricades shall have alternating black and reflectorized white (or yellow) stripes at an angle of 45 degrees. The stripe with shall be four to six inches.

During paving operations barricades may be supplemented with minimum size eighteen-inch (18") high traffic cones and delineators such that spacing between barricades and/or cones or delineators is no greater than twenty-five feet (25"). At all access points such as intersecting streets, alleys and driveways, barricades and/or cones shall be provided at five-foot (5') intervals so as to prevent vehicular access to the paving area. Where access from an intersecting street is prohibited, a "Road Closed" sign shall be provided. "No Left Turn" sign shall be provided wherever required by the Engineer.

Clearances from traffic lanes shall be 5 feet to the edge of any excavation and 2 feet to the face of any curb, pole, barricade, delineator or other vertical obstruction.

A 4 foot wide pedestrian walkway shall be maintained in the parkway area on each side of all streets, unless otherwise authorized by the Engineer. The minimum clearance from: the edge of pedestrian walkways to any traffic lane shall be 5 feet; the edge of pedestrian walkways to any work zone shall be 3 feet; and the surface of pedestrian walkways to any overhead obstruction shall be 7 feet.

The Contractor shall, at the end of each work day, have backfilled, compacted and placed a temporary drivable roadway surface on all work areas within traveled roadways prior to leaving the job site. Failure to comply to the satisfaction of the Engineer shall result in immediate correction by City forces, and all costs shall be borne by the Contractor.

Traffic control devices shall be marked with the Contractor's name as appropriate. At no time shall any traffic control devices marked with companies or agencies other than the Contractor or subcontractors, be utilized within the work area.

All said traffic controls and safety devices shall be maintained in clean condition, with any and all graffiti removed by the end of workday on which the graffiti was first reported to the Contractor.

If the traffic control devices are deemed unacceptable by the Engineer due to being damaged, dirty, or marked incorrectly, the Contractor shall replace the traffic control devices immediately. Should the Contractor fail to furnish traffic control devices within three (3) hours after being notified, the Owner will place such necessary items and the Contractor shall be liable to the Owner for providing such devices in accordance with the provisions above.

5-13.1.1 Vehicular Access.
At such times as driveways are inaccessible due to the Contractor's work they shall be blocked by two (2) Class II barricades or one (1) Class II barricades and two (2) delineators. Driveways that are ramped or planked for temporary access shall be provided with a delineator at each side.

5-13.1.2 Signage. The Contractor shall furnish, erect and maintain all construction traffic signage as required and specified.

All construction traffic signage shall be in place prior to commencing any work, placed as needed during construction, moved as necessary and removed only upon completion of all work.

All construction traffic signage and controls shall comply with the State of California Manual of Traffic Controls, Warning Signs, Lights and Devices for use in Performance of Work Upon Highways. All construction traffic signage used in the performance of the work shall be a minimum of the encapsulated lens (high intensity) type. All traffic controls and safety devices, equipment and materials, including but not limited to cones, channelizers, delineators, flashing warning lights, barricades, high level warning devices, telescoping flag trees, flags, signs, markers, portable barriers, flashing arrow signs, changeable message signs, markings and flagging equipment shall be provided and maintained in like new condition.

When a Traffic Signal is constructed as a part of the project, the Contractor shall place and maintain for one calendar month, a message board for each approach leg to a new traffic signal. The message board shall read "CAUTION - NEW TRAFFIC SIGNAL". The one month period shall begin from the day of activation. This requirement may be lessened or waived, on a case-by-case basis, by the Engineer.

The Contractor shall furnish and properly install, construct, erect, use and continuously inspect and maintain, twenty-four (24) hours per day, seven (7) days per week, including holidays, all said

devices, equipment and materials and all temporary and permanent pedestrian and driving surfaces as necessary to provide for the safety and convenience of, and to properly warn, guide, control, regulate, channelize and protect the vehicular traffic, pedestrian traffic, project workers, and the public throughout the entire limits of the work activity and beyond said limits as necessary to include areas affecting or affected by the work, from the date of notice to proceed to the completion and acceptance of the work. Any corrective work required to be performed by City forces shall be charged to the Contractor and paid in full before release of any bonds on the project.

All traffic cones shall be no less than 28 inches in height, except that shorter cones, 12 inches minimum height, may be permitted during striping maintenance operations where the only function of the cone is to separate traffic from the wet paint. All barricades used to delineate traffic at night or placed in or adjacent to the traveled roadway at night, shall be equipped with flashing warning lights.

Channelizers shall be required when lane restrictions, detours or other work conditions need to be maintained for periods longer than normal work hours. Channelizers shall be surface-mounted type and shall be furnished, placed and maintained at the locations shown on the plans or as approved by the Engineer and shall conform to these specifications. Channelizers shall be, at the Contractor's option, one of the following types, or approved equal: (1) Safe-Hit SH236SMA; (2) Repo "The Replaceable Post"; or (3) Carsonite, "Super Duck" SDF-436.SDF-436.

5-13.2 Traffic Control Plan

The Contractor shall provide a Traffic Control Plan to the agency for approval prior to the scheduled commencement of work. Comments and corrections shall be returned to the Contractor within five (5) working days.

The Contractor shall be required to maintain one lane in each direction when working on the roadway. Access to schools, businesses, etc. shall be maintained as necessary for their operations. If closures are authorized by the Engineer, all detour signage shall be installed prior to closure of specified portion of roadway(s), and shall be maintained during closure.
The Contractor shall make provision to allow pedestrians full access across work areas at existing crosswalks, while working within those areas.

Traffic controls, including but not limited to vehicular and pedestrian traffic controls, maintenance of vehicular and pedestrian access, detours, and street closures shall be in accordance with Subsection 7-1, of the current edition of the "Standard Specifications for Public Works Construction," including all its subsequent amendments, and the current edition of the "Work Area Traffic Control Handbook."

Traffic control and the Traffic Control Plan shall conform to the following:

a. All major streets shall remain open to through-traffic at all times, residential street will be closed to traffic only as long as it takes for material application and drying time.

b. The Traffic Control Plan shall indicate the traffic control requirements for the different types of work to be performed. The Contractor shall be

responsible for the preparation of Plans as necessary for specific items of work. These Plans shall be approved by the City's Engineer.

c. All traffic controls and safety devices, equipment and materials, including but not limited to cones, delineators, flashing warning lights, barricades, high level warning devices (flag trees), flags, signs, markers, portable barriers, flashing arrow signs, markings, and flagging equipment shall be provided and maintained in "like new" condition.

d. The Contractor shall furnish and properly install, construct, erect, use, and continuously inspect and maintain, twenty-four (24) hours per day, seven (7) days per week, all said devices, equipment and materials and all temporary and permanent pedestrian and driving surfaces as necessary to provide for the safety and convenience of, and to properly warn, guide, control, regulate, channelize and protect the vehicular traffic, pedestrian traffic, project workers, and the public throughout the entire limits of the work activity and beyond said limits as necessary to include area affecting or affected by the work, from the start of work to the completion of the work.

In the event the slurry and cape seal ravels, a "loose gravel" (C6) sign shall be placed to adequately warn the public.

e. High-level warning devices (flag trees) are required at all times for any work being performed within the roadway unless otherwise specifically authorized by the City's Engineer.

f. All barricades shall be equipped with flashing warning lights, and all traffic cones shall be no less than twenty-eight inches (28") in height, except that shorter cones, twelve inches (12") high or higher, may be used during striping maintenance operations where the only function of the cones is to protect the wet paint from the traffic.

g. Type III barricades, no less than six feet (6') in length and equipped with two (2) Type "N" markers each and two (2) flashing warning lights each, shall be used to close streets, except as otherwise specifically authorized in advance by the City's Engineer for minor maintenance work of no more than one (1) working days duration on weekdays, or on holidays only, and between 8:00 a.m. and 3:30 p.m. only. Said barricades shall be placed across the full roadway at each point of closure with the distance between barricades or between barricades and curbs, not exceeding three feet (3'), except that one (1) eleven-foot (11')-wide gap between barricades shall be provided at the center of the street. Barricades to the right of the street's center, facing the inbound vehicular traffic, shall also be equipped with one (1) Type C2 "Road Closed" sign each or one (1) Type C3A "Road Closed to Thru Traffic" sign each.

h. Except for residential streets, as otherwise directed and/or authorized by the City's Engineer, two-way vehicular traffic shall be maintained at all times within two (2) eleven foot (11')-wide lanes on streets, having an effective roadway width of forty-four feet (44') or more with restricted parking, and other streets of lesser widths may be reduced to one (1) twelve-foot (12') wide lane with work activity being limited to one side at a time, and with one-way vehicular traffic being maintained at all times by properly trained and experienced flaggers.

No reduction of the traveled way width shall be permitted on any City street before 8:00 a.m. nor after 3:30 p.m., on weekends or holidays, or when active work is not being done, unless prior authorization to do so is granted by the City's Engineer.

Arrow boards shall be required for all lane closures on major streets.

i. Properly trained and experienced flaggers shall be provided to traffic when said traffic is to be interrupted, when two-way traffic is to be reduced to one-way traffic, and at such other times as is necessary to safely pass the traffic through or around the work area, and when so directed by the City's Engineer.

j. Vehicular access to occupied residential property may be restricted on weekdays other than holidays between the hours of 8:00 a.m. to 3:30 p.m. while essential work activity is taking place, with specific prior written approval from the City's Engineer, providing the Contractor gives the owner and/or resident at least forty-eight (48)-hour advance written and oral notice. See Part 2, "Notification of Residents," herein.

Convenient and safe pedestrian access to occupied residential property shall be maintained at all times. Access to mailboxes must be maintained at all time, such that the postal delivery service is not interrupted.

Access to vacant and unused property may be restricted at the Engineer's discretion. Both vehicular and pedestrian access shall be maintained at all times to all other property except as otherwise specifically authorized in writing by the City's Engineer.

k. Any traffic control and safety devices and equipment being used which becomes damaged, destroyed, faded, soiled, misplaced, worn out, inoperative, lost, or stolen shall be promptly repaired refurbished and/or replaced, and any traffic control and safety devices and equipment being used which are displaced or not in an upright position from any cause, shall be promptly returned or restored to their proper position.

l. An unobstructed view of all signs and warning devices including but not limited to stop signs, stop ahead signs, street names signs, and other regulatory, warning and construction signs, markers, and warning devices shall be maintained at all times. No trucks or other equipment or materials shall be stopped, parked, or otherwise placed so as to obscure said signs, markers, and devices from the view of vehicular and/or pedestrian traffic to which it applies.

m. When entering or leaving roadways carrying public traffic, the Contractor's equipment, whether empty or loaded, shall yield to said public traffic at all times, except where the traffic is being controlled by police officers, fire officers, properly trained and experienced flaggers, or at traffic signalized intersections.

n. Stockpiling and/or storage of materials on any public right-of-way or parking areas will not be allowed without specific permission of the Engineer. Materials spilled along or on said right-of-way or parking areas shall be removed completely and promptly. All stockpile and/or storage areas shall be kept in a safe, neat, clean, and orderly fashion, and shall be restored to equal or better than original condition upon completion of the work.

o. Where vehicular access to abutting property must be restricted, the work shall be so selected, arranged, and scheduled that the person(s) requiring access to said abutting property and/or residents along said streets affected will be able to park within a reasonable distance of not more than five hundred feet (500') from their homes and/or destination. Residents must be supplied written notice of such restrictions a minimum of 48 hours in advance.

p. When work has been completed on a particular street or has been suspended or rescheduled, and said street is to be opened to vehicular traffic, all equipment, "NO PARKING" signs, other obstructions, and unnecessary traffic control devices and equipment shall be promptly removed from that street except as otherwise authorized or directed by the City's Engineer.

q. Should the Contractor be neglectful, negligent, or refuse, fail, or otherwise be unavailable to promptly, satisfactorily, and fully comply with the provisions specified and referred to hereinabove, the City reserves the right to correct and/or mitigate any situation, which in the sole opinion of the City's Engineer constitutes a serious deficiency and/or serious case of noncompliance, by any means at its disposal at the Contractor's and/or permittee's expense, and will deduct the cost therefore from the Contractor's progress and/or final payment. Such corrective action taken by the City shall not reduce or abrogate the Contractor's legal obligations and liability for proper traffic control and safety measures, and shall not serve to transfer

said obligations and liabilities from the Contractor to the City or the City's agents.

r. Violations of any of the above Provisions and/or Provisions of the referenced publications, unless promptly and completely corrected to the satisfaction of the City's Engineer, shall at the sole discretion of the City, be grounds for termination of the Contract, or shut down or partial shutdown of the work, without compensation to the Contractor and/or permittee, or liability to the City, all as prescribed by Contractual obligation or State law, whichever is applicable.

Full compensation for furnishing all labor, materials, tools, equipment, flaggers, lights, channelizers (surface mounted), temporary striping, barricades, portable flashing lights, flashing arrow signs, traffic control and detour plan, and incidentals required to comply with the provisions specified and referred to herein above, to provide all required traffic and pedestrian control for the duration of this contract, all as shown and as specified, shall be paid as specified in Section 01200 of the General Requirements and no other compensation shall be made therefore.

5-13.3 Edison Energized Conductors. The Contractor hereby promises and agrees that in the performance of the Work, he will employ and utilize only qualified persons, as hereinafter defined, to work in proximity to Edison's secondary, primary and transmission facilities. The term "qualified person" is defined as follows:

"Qualified Person". A person by reason of experience or instruction is familiar with the operation to be performed and hazards involved.

Contractor further promises and agrees that the provisions of this paragraph shall be and are binding upon any Subcontractor or Subcontractors that may be retained by it, and that the Contractor shall take such steps as are necessary to insure compliance by said Subcontractor or Subcontractors with the requirements of this paragraph.

5-14 CONTRACTOR'S RESPONSIBILITY FOR DAMAGE.

5-14.1 Responsibility for Damage. The Contractor agrees to and does hereby indemnify, defend and hold harmless the City, its elected officials and the Consultant and their officers, agents and employees from every claim or demand made, and every liability, loss, damage, or expense of any nature whatsoever, including attorney's fees and costs, which may be incurred by reason of:

(a) Liability for damages for (1) death or bodily injury to persons, (2) injury to loss or theft of property, (3) any other loss, damage or expense arising under either (1) or (2) above, sustained by the Contractor or any person, firm or corporation employed by the contractor upon or in connection with the work called for in this agreement, except for the liability resulting from the sole negligence or willful misconduct of the City, its elected officials and their officers, employees and agents who are directly employed by the City and the Consultant; and

(b) any injury to or death of persons or damage to property caused by any fault, neglect, default or omission of the Contractor, or any person, firm or corporation employed by the Contractor, either directly or by independent contract, including all damages due to loss or theft, sustained by any person, firm or corporation, including the City, arising out of, or in any way connected with the work covered by this agreement, whether said injury or damage occurs either on or off City property, provided that any of the foregoing (1) is attributable to personal injury, bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the work itself), including the loss of use resulting there from, and (2) is caused in whole or in part by any act or omission of the Contractor, any subcontractor, any supplier, anyone directly or indirectly employed by any of them or anyone for whose act or omissions any of them may be liable, regardless of whether or not caused in part by any act or omission (active, passive, or comparative negligence included, excepting the active negligence of the District) of a party indemnified hereunder.

(c) The Contractor, at its own expense, cost, and risk shall defend any and all actions, suits or other proceedings that may be brought or instituted against the City, its elected officials, officers, agents and employees and the Consultant, against any such claim, demand or liability, and shall pay or satisfy any judgment that may be rendered against the City, its elected officials, officers, agents or employees, in any such action, suit or other proceedings as a result thereof.

5-15 NO PERSONAL LIABILITY. Neither the City Council, the Engineer, the Consultant, nor any other officer or authorized assistant or agent shall be personally responsible for any liability arising under the contract.

5-16 CONTRACTOR'S RESPONSIBILITY FOR WORK. Except as provided above, until the formal acceptance of the Work by the City, the Contractor shall have the charge and care thereof and shall bear the risk of injury or damage to any part thereof by the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the Work. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof, except such injuries or damages occasioned by act of the federal government or the public enemy.

The City of Redlands shall not be held responsible for the care or protection of any material or parts of the work prior to final acceptance, except as expressly provided in these specifications.

The City shall not be responsible for security of the Contractors equipment or materials at the site. The City will not be responsible for theft or damage to any property or materials of the Contractor. Security for Contractor’s property shall be the responsibility of the Contractor.

5-17 WARRANTY OF WORK. The Contractor shall guarantee the Work against defective materials or workmanship for a period of (1) year from the date of completion date specified in the Notice of Completion, except where longer warranty periods are specifically stated. As specified in Section 2-4 in the GENERAL CONDITIONS, the Performance Bond shall remain in full force and effect during the warranty period.

All work which has been rejected, shall be remedied, or removed and replaced, by the Contractor at his own expense, with work conforming to the Plans and Specifications. Any defective material or workmanship which may be discovered before final acceptance or within (1) one year from the completion date specified in the Notice of Completion shall be corrected immediately by the Contractor at his own expense notwithstanding that it may have been overlooked in previous inspections and estimates. Failure to inspect work at any stage shall not relieve the Contractor from any obligation to perform sound and reliable work as herein described. It is the Contractor's ultimate responsibility to deliver at the time of final acceptance a complete project that complies in all details with these Contract Documents. All items shall be ready to operate.

Any omission or failure on the part of the Owner to discover or notify the Contractor of or to condemn defective work or material at the time of construction shall not be deemed an acceptance, and the Contractor will be required to correct defective work or material prior to final acceptance.

The Owner will endeavor to locate any errors or defective materials or workmanship and call them to the attention of the Contractor prior to subsequent work being performed. However, the Owner is under no obligation to do so and shall not be held liable because errors or defective material or workmanship by the Contractor are not discovered prior to subsequent work.

During the (1) one year warranty period, should the Contractor fail to remedy defective material and/or workmanship, or to make replacements within five (5) days after written notice by the Owner, it is agreed that the Owner may make such repairs and replacement and the actual cost of the required labor and materials shall be chargeable to and payable by the Contractor or his Surety.

Nothing in this section shall be construed to limit the rights of the Owner to immediately correct conditions which may be unsafe or which may pose a public health nuisance. Should said conditions later be found to be caused by defective material and/or workmanship, the Contractor and his Surety shall reimburse the Owner for costs reasonably incurred while attending the situation.

In the event it is necessary for the Owner to file suit to enforce any liability of the Contractor pursuant to this sections WARRANTY OF WORK, the Owner shall be entitled to recover from the Contractor, in addition to all other amounts found due and owing, costs of suit and reasonable expenses and fees, including reasonable attorneys' fees, incurred by the Owner in successfully enforcing the Contractor's obligations, all to be taxed as costs and included in any judgment rendered.

The warranty provided herein shall not be in lieu of, but shall be in addition to any warranties or other obligations otherwise imposed by the Contract Document or by law. The remedies provided herein shall not be exclusive and the Owner shall be entitled to any and all remedies provided by law.

5-18 NOTIFICATION OF RESIDENTS/BUSINESSES. The Contractor shall notify all residents, firms, institutions, agencies, and utility companies which may be affected by the work. Notification shall be by hand delivery of an approved notice within the project limits approved by the City. The notification process shall consist of two notifications, one prior to the start of construction for all properties within the project area and a second notification at least seven days in advance of any activity which may impact each specific property. In the event of any work within the downtown

area, the distribution of the second notification shall be at least fourteen days in advance of any activity. Activities impacting said properties and, therefore, requiring the above said notices include the following: the work itself; closure or partial closure of the street; and disallowance of street parking and disallowance of vehicular ingress to or egress from the property.

Said firms, institutions, agencies, and utility companies which must be notified of proposed work shall include, but are not limited to the following: public schools, private schools, day care centers, postal service, hospitals, governmental services, police department, fire department, ambulance services, Omnitrans, solid waste collection, and City street sweeping.

The proposed notice shall be submitted to the Engineer at least seven calendar days prior to the date of distribution for review and approval. The submittal shall also include a map identifying the limits of the work and proposed limits of distribution. The printed notices shall contain a general description of the work to be done, the name of the street with limits, the day and date of the work and the name and telephone number of the Contractor. The notice shall also include a statement that there will be no disruption of trash collection schedules and that trash should be set out by 6:00 a.m. on the scheduled day of pickup. If on-street parking will be affected the notice shall include a statement that no on-street parking will be allowed between the hours of 7:00 a.m. and 5:00 p.m. on the day of work, and a statement that it will be necessary to tow away parked vehicles at the owner's expense per California Vehicle Code CVC 22651L and CVC 22654D.

The Contractor will provide City with the dates and addresses of when project notifications are delivered to affected properties. City will verify the notification process is completed in compliance with the requirements of the specifications. Work will commence when City approves Contractor’s compliance with the requirements set forth in the specifications.

If on-street parking is affected, the Contractor shall also post pre-approved "NO PARKING-TOW WAY" signs on 1 x 2 wood stakes or barricades at one hundred foot (100’) maximum spacing along the affected areas of the street, 48 hours prior to the start of the work. The "NO PARKING-TOW AWAY" signs shall contain the day, date, and hours that parking will be prohibited on that particular street and a statement that parked vehicles will be towed away at owner's expense per California Vehicle Code CVC 22651L and CVC 22654D. The Contractor shall maintain said signs throughout the day of work, and shall start the removal of said signs by 4:00 p.m. and complete the removal by 6:00 p.m. on said day of work or as otherwise directed by the Engineer.

The Contractor shall document the day, date, and time the signs are installed because the no parking restriction cannot be enforced until the signs have been in place 24 hours. Posting of signs on trees, utility poles, light standards and other existing parkway improvement is strictly forbidden.

In the event of street resurfacing operations, the notices to residents shall contain a statement that the street to be resurfaced will be closed to vehicular traffic, and the suggestion that if they require the use of their vehicles on the day of the resurfacing work, they should consider parking their vehicle on a nearby street which is not scheduled for a resurfacing application.

In the event scheduled work is delayed, the Contractor shall immediately remove all "NO PARKING" signs. The contractor must notify all previously notified, in person and with printed notices, that the

work will be rescheduled and that they will be re-notified 48 hours in advance. The Contractor shall have an adequate supply of approved notifications for distribution to residents.

Full compensation for conforming to these requirements shall be considered as included in the various Contract items of work involved, and no additional compensation will be allowed therefore.

Failure to comply with this section shall result in a penalty assessment imposed of up to $10,000 per violation at the City's discretion.

SECTION 6 – PROSECUTION AND PROGRESS OF THE WORK

6-1 CONSTRUCTION SCHEDULE AND COMMENCEMENT OF WORK. - *Add the following paragraph:*
Contractor shall notify Underground Service Alert (USA) at 1 (800) 227-2600, two working days prior to starting work, and must submit verification number to the City prior to starting work.

6-1.2 Commencement of the Work. - *Amend the second sentence as follows:*
"The work shall start within 10 days thereafter, and be diligently prosecuted to completion within the Contract Time."

6-3 TIME OF COMPLETION.

6-4.1 General. - *Add the following paragraphs:*
If saturated soil is encountered during construction due to leaks in an existing utility, contractor shall remove saturated material and replace with a suitable backfill material until adequate compaction can be attained by verification from the City's Geotechnical Engineer.

Prior to any removal of saturated material, contractor shall discuss the methods of remediation with the City's representative. Approval from the City, or the City's representative, shall be obtained for any amount of saturated material removal in which the contractor anticipates to be compensated for, if approval is not obtained all costs shall be borne by the contractor.

Up to a 14 day delay in paving operations may be requested after all leaks have been resolved to provide time for excess moisture to dissipate, at no additional cost to the city, in lieu of removing and replacing the saturated soil. A no cost change order will be prepared to provide the contractor with additional contract time if such delay is requested by the City.

6-9 LIQUIDATED DAMAGES. The value of liquidated damages noted in this section is amended to five hundred dollars ($500) per working day.

6-10 NOTICE AND SERVICE THEREOF. Any notice required or given by one party to the other under the Contract shall be in writing and shall be dated and signed by the party giving such notice or by duly authorized representative of such party. Any such notice shall not be effective for any purpose whatever unless served in the following manner:

Notice shall be given to the Contractor by personal delivery thereof to said Contractor or to his authorized representative at the project site, or by deposing the same in the United States Mail enclosed in a sealed envelope addressed to said Contractor at the address established for the conduct of work under this Contract, certified and with postage prepaid.

Notice shall be given to the Surety, or any other person, by personal delivery to said Surety or other person, or by depositing the same in the United States Mail, enclosed in a sealed envelope addressed to such Surety or persons at the address of said Surety or persons last communicated by him to the party giving the notice, certified and with postage prepaid.

Notice shall be given to the Owner by personal delivery thereof or by depositing the same in the United States Mail enclosed in a sealed envelope, certified and with postage prepaid. The address of record for the owner is:

City of Redlands
Municipal Utilities & Engineering Department
P.O. Box 3005
35 Cajon Street, Suite 15A
Redlands, CA 92373

6-11 PUBLIC RECORDS ACT. All documents, Plans, specifications and all other information relating to the conduct of the City's business, including information submitted by the Contractor, shall become the exclusive property of the City and except as provided by law shall be deemed public records. Said information shall be subject to the provisions of the California Public Records Act (Government Code Sections 6250 et seq.).

Under no circumstances will the City be responsible or liable to the Contractor, submitter or any other party for the disclosure of any records or information submitted to the City, regardless of whether such records or information are labeled "Trade Secret", "Confidential", or "Proprietary" (or words to similar effect) and regardless of whether the disclosure is required by law or a court order or occurs through inadvertence, mistake, or negligence on the part of the City or its officers, employees, and/or Contractors.

The City will not advise as to the nature or content of documents entitled to protection from disclosure under the California Public Records Act, including interpretations of the Act or the definition of "Trade Secret". The submitting party shall be solely responsible for all determinations made under the Act, and where appropriate for clearly and prominently marking each and every page or sheet of information with "Trade Secret", "Confidential", or "Proprietary". Each submitting party is advised to contact its own legal counsel concerning the California Public Records Act and its applicability to the submitting party's own circumstances.

In the event of litigation concerning the disclosure of any information submitted by the submitting party, the City's sole involvement will be as a stakeholder, retaining the information until otherwise ordered by a court. The submitting party, at its sole expense and risk, shall be responsible for any and all fees and costs for prosecuting or defending any action concerning the information, and shall

indemnify and hold the City harmless from all costs and expenses including attorneys' fees, in connection with such action.

SECTION 7 - MEASUREMENT AND PAYMENT

7-3 PAYMENT.

7-3.2 Partial and Final Payment. - *Delete and replace with the following:*
The closure date for the purpose of making monthly progress payments shall be assigned by the Engineer during the pre-construction meeting. Payment, less deductions, unearned work and retention, will be made within 30 days of the closure date. If a dispute exists between the City and the Contractor regarding an item included in the Contractor's Monthly Progress Payment Request, progress payments will be withheld until said dispute is resolved, in which case longer period of time will be required to make such payment. No such payment shall be required to be made, when in the judgment of the Engineer, the total value of the work since the last estimate amounts to less than $500. If, in the opinion of the Engineer, work is not progressing according to the approved schedule, payments may be withheld until the Contractor returns to the approved schedule.

Deductions will be made for: (1) amounts due the Owner for equipment or material furnished or services rendered; (2) amounts due the Owner under the terms of the Contract; (3) amounts of any claims of lien filed with the Owner; (4) accrued amounts of liquidated damages; (5) amounts required to be deducted by Federal, State or local governmental authorities. From the balance thus determined will be deducted the amounts of all previous payments, and the remainder shall constitute the monthly payment due the Contractor.

A retention of five percent (5%) will be withheld from each and every progress payment to the Contractor. This percentage will remain constant throughout the duration of the Contract. The City shall make a progress payment within thirty (30) days after receipt of an undisputed and properly submitted payment request from Contractor pursuant to Public Contract Code section 20104.50.

After completion of the work to the satisfaction of the Engineer, the Engineer shall make a final estimate of the amount of work done. The City shall pay the entire sum so found to be due after deducting there from all previous payments and all amounts to be retained under the provisions of the Contract. All prior partial estimates and payments shall be subject to correction in the final estimate and payment. The final payment shall not be due and payable until the expiration of thirty-five (35) days from and after the recordation of the Notice of Completion filed by the City.

As provided by paragraph 22300 of the California Public Contract Code, the Contractor may substitute securities for any monies withheld by the City to ensure performance under the Contract. Substitute securities shall be deposited in a financial institution in a form acceptable to the City of Redlands. The financial institution shall be located within the City limits of the City of Redlands. The Escrow Agreement to be used is set forth in Public Contract Code section 22300.

7-3.3 Delivered Materials. - *Delete and replace with the following:*
No payment will be made for materials or equipment delivered but not yet incorporated in the work.

7-4.2.6 Extras. Without invalidating the Contract, the City may order extra work or make changes by altering, adding or deducting from the work, the Contract sum being adjusted accordingly and the consent of the Surety being first obtained where necessary or desirable. All the Work of the kind bid upon shall be paid for at the price stipulated on the proposal, and no claims for any extra work or material shall be allowed unless the work is ordered in writing by the engineer and the price is stated in such order.

7-4.2.7 Claims for Extra Costs. No claim for extra work or cost shall be allowed unless the same was done in pursuance of a written order by the Engineer, as aforesaid, and the claim presented with the first estimate after the changed or extra work is done. When work is performed under the terms of the General Conditions, the Contractor shall furnish satisfactory bills, payrolls, and vouchers covering all items of cost and when requested by the City, give the City access to accounts relating thereto.

After completion of the work to the satisfaction of the Engineer, the Engineer shall make a final estimate of the amount of work done. The City shall pay the entire sum so found to be due after deducting there from all previous payments and all amounts to be retained under the provisions of the Contract. All prior partial estimates and payments shall be subject to correction in the final estimate and payment. The final payment shall not be due and payable until the expiration of the thirty-five (35) days from and after the recordation of the Notice of Completion filed by the City.

SECTION 8 - FACILITIES FOR AGENCY PERSONNEL

This section is deleted in its entirety.

SECTION 9 - ASSIGNMENT OF UNFAIR BUSINESS PRACTICES CLAIMS

9-1. In entering into a public works contract or a subcontract to supply goods, services, or materials pursuant to a public works contract, the Contractor or subcontractor offers and agrees to assign to the City all rights, title and interest and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2, commencing with section 16700 of part 2 of division 7 of the Business and Professions Code), arising from the purchase of goods, services, or materials pursuant to this public works agreement. This assignment shall be made and become effective at the time the City tenders final payment to the Contractor, without further acknowledgment by the Parties.

SECTION 10 - TRENCHING AND EXCAVATION

10-1. If this contract involves digging trenches or other excavations that extend deeper than (4) feet below the surface, the following shall be done pursuant to California Public Contract Code Section 7104:

A. That the Contractor shall promptly and before the following conditions are disturbed, notify the City in writing, of any:

(1) Material that the Contractor believes may be material that is hazardous waste, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II or Class III disposal site in accordance with provisions of existing law.

(2) Subsurface or latent physical conditions differing from those indicated.

(3) Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the contract.

B. That the City shall promptly investigate the conditions, and if it finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of work shall issue a change order under the procedures described in the contract.

C. That, in the event that a dispute arises between the City and the Contractor whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the Contractor cost of, or time required for, performance of any part of the work, the Contractor shall not be excused from any scheduled completion date provided for by the contract, but shall proceed with all work to be performed under the contract. The Contractor shall retain any and all rights provided either by contract or by law which pertains to the resolution of disputes and protests between the contracting parties.

SECTION 11 - REMOVAL, RELOCATION OR PROTECTION OF EXISTING UTILITIES

11-1. Pursuant to Government Code Section 4215 et seq, the City shall assume the responsibility between the parties to this contract, for the timely removal, relocation, or protection of existing main or trunk line utility facilities located on the site of the construction project for this contract, if such utilities are not identified by the public agency in the plans and specifications made a part of the invitation for bids.

11-2. The Contractor shall be compensated for the costs of locating, repairing damage not due to the failure of the Contractor to exercise reasonable care, and removing or relocating such utility facilities not identified in the plans and specifications with reasonable accuracy and for equipment on the project necessarily identified during such work.

11-3. The Contractor shall not be assessed liquidated damages for delay in completion of the project, when such delay was caused by the failure of the City, or the owner of the utility to provide for removal or relocation of such utility facilities.

11.4. The City shall not be required to indicate the presence of existing service laterals or appurtenances whenever the presence of such utilities on the site of the construction project can be inferred from the presence of other visible facilities, such as buildings, meter and junction boxes, on adjacent to the site of construction, provided, however, nothing herein shall relieve the City from identifying main or trunk lines in the plans and specifications.

11.5. Nothing herein shall preclude the City from pursuing appropriate remedy against the utility for delays which are the responsibility of the utility.

11.6. If the Contractor, while performing the contract, discovers utility facilities not identified by the City in the contract plans or specifications, Contractor shall immediately notify the City and the utility in writing.

11.7. The public utility, when it is the owner, shall have the sole discretion to perform repairs or relocation work or permit the Contractor to do such repairs or relocation work at a reasonable price.

11.8. Contractor shall comply with Government Code Section 4216 through 4216.9.

11.9. Conduits from existing street light and traffic signal systems may be encountered during construction of this project. All removals, relocations, and/or replacements of existing conduit systems shall be performed in accordance with these specifications and City standards, by a qualified electrical contractor. All costs for said work shall be borne by the Contractor and paid as a part of the various items of work requiring such removals, relocations, and/or replacements, and no other compensation shall be made therefore.

SECTION 200 - ROCK MATERIALS

200-2 UNTREATED BASE MATERIALS.

200-2.1 General. - *Amend the first paragraph as follows:*
"Materials for use as untreated base or subbase shall be classified in the order of preference as follows:
Crushed Aggregate Base
Crushed Miscellaneous Base
Pulverized Miscellaneous Base."

200-2.4.1 General. - *Delete the second sentence and replace with the following:*
"The material shall be free of deleterious material as defined in 200-1.1."

200-2.4.2 Grading. - *Amend the first sentence of paragraph 1 as follows:*
"The material shall be uniformly graded and shall conform to the 'fine' gradations:"

200-2.5.1 General. - *Delete the third sentence and replace with the following:*
"The material shall be free of deleterious material as defined in 200-1.1."

200-2.8.1 General. - *Amend as follows:*
Delete the second sentence of paragraph 1 and replace with the following:
"Pulverized miscellaneous base may contain underlying base material."

Delete the third sentence of paragraph 1 and replace with the following:
"The material shall be free of deleterious material as defined in 200-1.1."

SECTION 201 - CONCRETE, MORTAR AND RELATED MATERIALS

201-1 PORTLAND CEMENT CONCRETE.

201-1.1.1 General - *Add the following paragraph:*
The Contractor shall furnish the Engineer in the field with a copy of the mix design to be used, and with a legible certified weighmaster's certificate for each load of PCC delivered to the project. PCC delivered to the project site having a water content and/or slump greater than that specified in the mix design, shall be rejected and removed from the project site.

201-1.1.2 Concrete Specified by Class and Alternate Class - *Amend Table 201-1.1.2.(A) as follows:*

Street Surface Improvements section -
All concrete in this section shall have a minimum compressive strength at 28 days of 22,410 kPa (3,250 pounds per square inch), and meet the requirements of class 330-C-23 (560-C-3250) concrete.

Sewer & Storm Drain Facilities section, Sidehill Surface Drainage Facilities subsection -
All concrete in this subsection shall have a minimum compressive strength at 28 days of 22,410 kPa (3,250 pounds per square inch), and meet the requirements of class 330-C-23 (560-C-3250) concrete.

201-1.4.3 Transit Mixers. - *Replace the first sentence in paragraph 6 with the following:*
The total elapsed time between addition of water at the batch plant and the completion of the discharge of the PCC from the mixer, shall not exceed ninety (90) minutes. All PCC remaining in the mixer, after said ninety (90) minutes time limit, shall be rejected and removed from the project site.

SECTION 203 - BITUMINOUS MATERIALS

203-3 EMULSIFIED ASPHALT.

203-3.1 General. - *Modify the section by adding the following:*
Asphalt emulsion shall be a QUICKSET ANIONIC OR CATIONIC EMULSIFIED ASPHALT conforming to the requirements of Subsection 203-1.3, "Test Reports and Certification", and Subsection 203-1.2, "Testing Requirements" of the Standard Specifications.

The latex additive shall be Ultra Pave 70 (for anionic) or Ultra Pave 65 K (for cationic) or an approved equal. The latex shall be added at the emulsion plant after weighing the asphalt and before the addition of mixing water. The latex shall be added at a rate of two to two-and-one-half (2 to 225) parts to one-hundred (100) parts of emulsion by volume.

203-5 SLURRY SEAL.

203-5.1 General. - *Delete the sentence and replace with the following:*
Slurry seal shall be emulsion-aggregate slurry (EAS) conforming to 203-5.4.

203-5.2 Mix Design. - *Modify the section by adding the following:*

(f) Admixtures, such as Portland Cement or aluminum sulfate may be mixed into the slurry material to adjust curing time such that the applied slurry can support vehicular traffic within 60 minutes.

(g) Use of slag shall not be permitted.

(h) Deliveries of aggregate and emulsion shall not be made without the engineer present. Emulsion is not to be transferred to an on-site storage tanker without the sieve test performed by the City.

203-5.3.2 Grading. - *Delete the sentence and replace with the following:*
The combined aggregate gradation shall be determined in accordance with ASTM C136 and conform to Type II requirements shown in Table 203-5.3.2 (A).

203-5.4.1 General. – *Modify the paragraph and replace with the following:*
EAS shall be a stable mixture of emulsified asphalt, aggregate, water, a set control agent, and latex. EAS shall be Type II-CQS-1h-EAS.

203-5.4.2.1 Aggregate. – *Delete the sentence and replace with the following:*
Aggregate shall be Type II conforming to 203-5.3.

203-5.4.2.2 Emulsified Asphalt. – *Modify the first paragraph and replace with the following:*
Emulsified asphalt shall be quick-set, and contain latex. Quick-set emulsified asphalt shall be CQS-1h conforming to 203-3.

203-6 ASPHALT CONCRETE.

203-6.1 General. - *Add the following paragraph:*
Unless otherwise approved by the Engineer, asphalt concrete for paving shall be C2-PG 64-10 (1/2") for finish paving or B-PG 64-10 (3/4") for base paving. Asphalt concrete for Type D1 or Type D2 curb shall be D2 –PG 70-10.

SECTION 206 - MISCELLANEOUS METAL ITEMS

206-7 TRAFFIC SIGNS.

206-7.1 General. The Contractor shall furnish or relocate and erect all traffic signage as required and specified.

All new traffic signage shall be a minimum of the encapsulated lens (high intensity) type, have an anti-graffiti protective covering and be installed on new posts. All traffic signage to be relocated shall be installed on new posts.

206-7.2 Protective Covering. Anti-graffiti protective covering shall be Type 1150-POF, manufactured by 3M Company, or approved equal.

206-7.3 Post and Base. New posts and bases shall be Ultimate Sign Support System as manufactured by Western Highway, or approved equal.

SECTION 207 – GRAVITY PIPE

207-2 REINFORCED CONCRETE PIPE (RCP).

207-2.1 General. - *Add the following sentences to paragraph 2:*
The minimum D-load for any RCP shall be 1,350. The minimum size for RCP shall be 18 inches (457 mm) unless otherwise approved by the Engineer.

SECTION 211 - MATERIAL TESTS

211-1 COMPACTION TESTS.

211-1.4 General. The Contractor shall be responsible for all quality control for all work. The Contractor shall complete all necessary testing to ensure the quality requirements within the specifications are achieved. The Contractor shall conduct the compaction testing by a geotechnical engineering firm and the results of the testing shall be made available to the Engineer.

The City will complete assurance testing throughout the project by an independent testing firm. The City will perform the first compaction test required at any location. If such test does not meet the required specifications, the City will make additional tests until the required compaction is obtained and withhold from the final payment due the Contractor, the cost of all such additional tests. To be acceptable, tests must be ordered and witnessed by the City. Tests will be ordered by the City and performed at a location and depth as directed by the City. The Contractor shall assist the City in performing these tests as necessary. The Contractor shall provide to the City the maximum dry density and the optimum moisture content results of backfill and bedding material when requested by the City.

SECTION 214 - TRAFFIC STRIPING, CURB AND PAVEMENT MARKINGS, AND PAVEMENT MARKERS

214-4 PAINT FOR STRIPING AND MARKINGS.

214-4.1 General. - *Amend the first sentence in paragraph 4 as follows:*
"Glass beads conforming to 214-3 shall be mechanically applied at a rate of 0.6 to 0.8 kg of beads per liter (5 to 7 pounds of beads per gallon)."

SECTION 300 - EARTHWORK

300-1 CLEARING AND GRUBBING.

300-1.1 General. - *Amend as follows:*

Amend paragraph 3 as follows:
"The natural ground surface shall be cleared of all vegetable growth, such as trees, logs, upturned stumps, roots of downed trees, brush, grass, weeds, shrubs, ground cover, tree stumps, decorative landscape rocks, edging, railroad ties, other decorative landscape treatments, boulders, rock, portland cement concrete, and all other objectionable materials, within the limits of construction."

Add the following paragraphs:
Grubbing and removal of organic debris shall include the repair and/or replacement of all parkway irrigation piping and systems necessary to perform work on this Contract and capping pipelines until such time that permanent repairs and/or replacements have been made.

All debris removed from the project site under this item shall be disposed of at an approved dump site. All transportation costs and dump fees shall be borne by the Contractor.

Clearing and Grubbing shall include, but is not limited to, the following:

1. Removal of existing AC berms.

2. Removal of all curb and gutter, cross gutters, and spandrels shall be replaced within three (3) calendar days. The Asphalt Concrete patch for areas with curbs and gutters removed and replaced shall be placed within two (2) working days after the curb and gutter, cross gutters, and spandrels are replaced. Removal of all sidewalks shall be replaced within three (3) calendar days.

3. Saw cut and removal of poles, posts, PCC pavements, curb, gutter, and sidewalk. Holes resulting from removal of existing poles and posts from existing PCC, AC pavements and curbs and gutters, shall be filled or patched with like materials. Self-propelled drop hammers will not be allowed for removals.

4. Removal of all raised pavement markers not conforming to the approved plan or conflicting with the proposed striping as shown on the plans in accordance with Subsection 312-3, Removal, of the Standard Specifications.

5. Removal and disposal of boulders, rock or PCC.

6. All trees and shrubs less than 3m (9 ft) directly above the entire sidewalk surface shall be trimmed and removed by the contractor to allow a clear path of travel for pedestrians.

7. Irrigation system relocation:

Any irrigation systems in conflict with the proposed improvements that are removed, damaged, disturbed, or broken shall be modified, repaired, and/or replaced to be operable and provide full irrigation coverage to the areas requiring irrigation using new materials, equal or better than the original materials, with 20 mm (3/4 in) Schedule 40 PVC being the minimum acceptable for underground lines and 13 mm (1/2 in) Schedule 80 being minimum acceptable for risers and with the systems not being out of operation for more than two (2) days. No payment for work associated with the irrigation repair will be released, until all irrigation is complete, operable and accepted by the City.

All trees, shrubbery and lawns deprived of normal irrigation watering due to a disruption of service caused by the Contractor's operations shall be regularly and thoroughly irrigated by the Contractor so that said plantings will not be damaged. If any trees, shrubbery or lawns die or suffer unacceptable damage as a result of or precipitated by the Contractor's operations the Contractor shall replace same with the same plant species and size. Existing grass lawns within areas that must be excavated and/or re-graded shall be cut into approximate 305 mm (1 ft) squares, removed, protected, cared for and replaced as soon as possible. Dead, dying, and unacceptably damaged grass shall be replaced with new grass sod.

8. Existing inlets, slotted drains, drainage pipes, concrete gutters, drainage pipes, where any portion of such structure is within 1m of the grading plane in the excavation areas, or within 300 mm (1 ft) of original ground in embankment areas, or where shown on the plans to be removed, shall be completely removed and disposed of accordingly.

9. Removal and disposal of existing drainage inlet structure and PCC or AC apron.

10. The Contractor shall dispose all materials not being salvaged outside of the right-of-way and shall pay for all costs for disposal.

11. Removal and disposal of any abandoned utilities that may interfere with the improvements.

12. Self-propelled drop hammers will not be allowed for removals.

300-1.3.1 General. - *Add the following paragraphs:*
The Contractor shall dispose portland cement concrete, stone rubble, and brick at an approved dump site.

All reprocessed asphaltic cement concrete may be placed as the lower course of crushed aggregate base material. If the Contractor chooses not to reprocess the material, disposal at an approved dump site shall be required. All costs for disposal shall be borne by the Contractor. If the Contractor chooses to reprocess material, it shall be protected and remain contaminate-free, otherwise disposal at an approved dump site will be required with all costs borne by the Contractor.

All reprocessed asphaltic cement concrete to be used as crushed aggregate base shall be ground to conform to Section 200-2.2.

300-1.3.2 (a) Bituminous Pavement. - *Amend the following:*

Amend the second sentence as follows:
"Saw cutting of edges to be joined shall be with a power-driven saw. The groove shall be cut to a minimum depth of 4 inches (102 mm)."

Amend the third sentence as follows:
"Where bituminous pavement is to be removed, a cold mill header cut of maximum 6 feet (1.8 m) in width perpendicular to the join line shall be made, and a minimum laying depth of 1 inch (25mm) of new pavement material shall be provided at the join line."

Amend the fourth sentence as follows:
"The edges of existing concrete pavement adjacent to the trench shall be saw cut to neat straight lines for the purpose of removing the damaged pavement areas."

Add the following sentence:
Work under this item shall include asphalt concrete berms.

300-1.3.2 (b) Concrete Pavement. - *Amend the following:*

Amend the second sentence as follows:
"Saw cuts shall be made to a minimum depth of 4 inches (102 mm)."

Amend the third sentence as follows:
"If a saw cut in concrete pavement falls within 5 feet (1.5 m) of a construction joint, cold joint, expansion joint, or edge, the concrete shall be removed to the joint or edge."

300-1.3.2 (c) Concrete Curb, Walk, Gutters, Cross Gutters, Driveways and Alley Intersections. - *Amend the following:*
Amend the first sentence as follows:
"Concrete shall be removed to neatly sawed edges with saw cuts made to a minimum depth of 4 inches (102 mm)."

Amend the third sentence as follows:
"No section to be replaced shall be smaller than 36 inches (1 m) in either length or width."

Amend the fourth sentence as follows:
"If the saw cut in sidewalk or driveway would fall within 36 inches (914 mm) of a construction joint, expansion joint, or edge, the concrete shall be removed to the joint or edge, except that where the saw cut would fall within 12 inches (300mm) of a score mark, the saw cut shall be made in and along the score mark."

Amend the fifth sentence as follows:
"curb and gutter shall be sawed to a depth of 4 inches (102 mm) on a neat line at right angles to the curb face."

300-1.3.2 (d) Striping and Markings. All existing striping, markings and raised pavement markers shown to be removed or necessary to be removed from paving areas. This item includes removal in compliance with applicable laws and cleanup of residue from the operation.

All striping, markings and raised pavement markers removed beyond the limits shown on the plans for and/or at the convenience of the Contractor shall be replaced at the Contractor's expense.

300-1.3.2 (e) Structures. All existing concrete structures (reinforced or non-reinforced) as shown on the plans to be removed or abandoned, including but not limited to, undersidewalk drains, manholes, headwalls, bulkheads, drop inlet structures, energy dissipaters, catch basins, vaults and pipelines. Abandonment shall include all cuts and concrete plugs necessary to seal ends or openings of abandoned pipes or structures.

300-1.3.2 (f) Rock Curbs. All rock from rock curb removals, as shown on the plans or required for construction of the project, shall be transported, delivered and unloaded at a storage site as directed by the Engineer.

300-1.3.2 (g) Miscellaneous Removals. All other removals of facilities, as shown on the plans but not covered under separate bid items, and any underground facilities found during the work and not shown on the plans shall be performed. The City has endeavored to show all known underground facilities but is not responsible for unknown or abandoned facilities. Unknown underground facilities shall be paid as extra work.

300-1.3.2 (h) Miscellaneous Relocations. All relocation work as shown on the plans or required for construction of the project, but not covered under separate bid items, shall be included as a part of Subsection 300-1 Clearing and Grubbing. All relocation work performed as a part of clearing and grubbing work shall conform to the requirements and specifications of the agency or utility having jurisdiction over the item to be relocated.

300-1.4 Payment. - *Add the following sentence to paragraph 1:*
Payment for work on this item shall be made as a percentage of the work completed at each monthly payment.

300-2 UNCLASSIFIED EXCAVATION.

300-2.2.2 Wet Material. - *Amend the second sentence of the paragraph:*
"If such high moisture content is not the result of any action on the part of the Contractor, or inaction in protecting the work during the course of the contract, the work involved will be paid for in the following manner: Over-excavation and disposal work shall be considered "extra work," with backfill and compaction of crushed aggregate base paid under the appropriate bid item in these specifications."

300-12 MISCELLAENOUS GRADING. The parkway, whether landscaping exists or not, shall be graded and compacted to achieve drainage towards the street at a slope of 2%. Grading shall be coordinated such that it is the last item of work to be completed, prior to site clean-up. Loose material and dirt shall be raked, compacted and distributed throughout the parkway area. Areas

adjacent to installed improvements must be graded to a level within one inch from the finished surface. Extra dirt/fill shall be removed from the project in accordance with Specifications.

The Contractor, at his expense shall photo-document pre-construction conditions prior to starting excavating. After construction is completed, the Contractor shall photo-document the finished grade. The Contractor shall provide the City with said photos with addresses identifying each property location, the direction the photograph was taken (facing North, South etc). The Contractor shall keep a copy of the photos (either electronically or hard copy) and provide the City with electronic copies of the photos.

SECTION 301 - TREATED SOIL, SUBGRADE PREPARATION AND PLACEMENT OF BASE MATERIALS

301-1 SUBGRADE PREPARATION.

301-1.3 Relative Compaction. - *Amend the second sentence of paragraph 1 as follows:*
"When base material, curb, gutter, alley pavement, driveways, or sidewalks are to be placed on the subgrade material, the top 6 inches (150mm) of such subgrade material shall be compacted to a relative compaction of 95 percent."

301-2.1 General. – *Add the following paragraphs:*
The contractor shall use 'crushed aggregate base' or 'crushed miscellaneous base, fine graded' as the base material. The use of 'processed miscellaneous base,' 'select subbase,' or 'disintegrated granite' shall not be used as base material.

The contractor may use 'pulverized miscellaneous base' (grindings) as part of the crushed base material. Said grindings shall be uncontaminated and placed in an even thickness as the lower course of crushed base material. Spreading and compacting shall comply with Sections 301-2.2 and 301-2.3.

301-2.3 Compacting. – *Amend the second sentence of paragraph 3 as follows:*
"Compaction in the excepted areas shall be as specified in 211-1 with each layer of compacted base material having a minimum relative compaction of 95 percent."

301-2.4 Measurement and Payment. – *Add the following paragraph:*
Payment shall be made for cold-planing, storing, placing, and compacting reprocessed asphalt concrete pavement (grindings) as part of the crushed aggregate base (CAB) material. The volume of grindings placed shall be figured and a tonnage figure computed using 9.35 kg/m^3 (150 pounds per cubic foot). This tonnage figure shall be paid as part of the crushed aggregate base tonnage for this project.

301-7 FULL DEPTH RECLAMATION WITH MECHANICAL STABILIZATION (FDR-25)

301-7.1 Description. This rehabilitation alternative consists of pulverizing the existing asphalt concrete (AC) layer along with the underlying unbound material to a depth of 6, 9 or 12 inches per

plan and specifications. The properties of this layer are considered to be similar to an Aggregate Subbase material with a modulus of at least 25 ksi.

The manufacture of the recycled base course shall be done in-place by pulverizing and blending the existing AC layer and base materials, if present. The process shall be accomplished in accordance with these specifications and conform to the lines and grades shown in the plans or as established by the engineer.

301-7.2 Construction. The asphalt concrete surfacing and underlying base materials shall be pulverized such that 100 percent of the material will pass a two-inch sieve and a minimum of 90 percent will pass a one and one-half inch sieve. All materials other than rock and pulverized asphalt concrete shall be broken up such that these materials will pass a one inch sieve. The pulverized materials shall be free of roots, weeds, wood, and construction debris. All grass and other vegetation shall be removed from the edge of the exiting pavement or lip of gutter pan to prevent contamination of the pulverized bituminous material during the milling operation.

Trimming and disposal of excess material, if required, will be performed on the intimate mixture of pulverized asphalt concrete, base materials and subgrade soil. Excess pulverized material is the surplus that results after trimming and grading the pulverized pavement section to the lines and grades matching existing and/or per plans and specifications.

Do not start pulverized roadbed activities if the ambient air temperature is below 40F. If the ambient air temperature falls below 40F, you may only compact and finish pulverized roadbed. Before starting daily pulverized roadbed activities, sweep the pulverized roadbed area constructed the previous day to remove loose material.

301-7.3 Surface Preparation. Before pulverized roadbed activities start, prepare the existing roadway surface by:

1. Clearing foreign matter including vegetation
2. Removing standing water
3. Referencing the profile and cross slope
4. Marking the proposed longitudinal cut lines on the existing pavement as follows:
   4.1. Cut lines must coincide with points where the existing cross slope changes, approximately at the centerline and edge of traveled way
   4.2. Cut lines must indicate the sequence of the cuts
5. Referencing existing lane lines and striping layout

Final subgrade surface shall slope away from the street centerline to a maximum of 3% grade. Pulverized asphalt material must be used as base material to meet new cross slope requirements. Native sub-grade material may need to be hauled off to allow for the use of all pulverized base material. No additional compensation will be allowed for any sub-grade removal and haul-off if required. Any contaminated material will be removed and disposed of by the contractor off site at his expense. Any shortage of material, caused by premature disposal of the indicated surplus material by the contractor, shall be replaced by it and no additional compensation will be allowed for such replacement.

301-7.4 Spreading, Mixing, and Compacting. Do not use a heating device to soften the pavement. Remove any visible oversized materials in the pulverized roadbed mixture prior to shaping and compacting. If you encounter unstable subgrade or rocks greater than 4 inches in the roadway section, notify the Engineer. The Engineer determines the extent of the unsuitable material and the corrective measures to be taken.

According to the Section 301-2.3, the compaction shall always be commenced along the edge of the area to be compacted and the roller shall gradually advance toward the center of the area to be compacted. Rollers shall be operated along lines parallel or concentric with the centerline of the road being constructed, and no material variation therefrom will be permitted. All rollers must be maintained in good mechanical and working condition.

The relative compaction of each layer of compacted base material shall not be less than 95 percent. ASTM D2922, Methods of Density of Soil and Soil Aggregate in Place by Nuclear Methods, (or ASTM D1556). After compaction, the sub-grade shall be firm, and unyielding.

301-7.5 Finishing. The finished pulverized roadbed surface must not vary more than 0.05 foot from the lower edge of a 12-foot straight edge laid in directions parallel and perpendicular to the centerline. Variations within the above specified tolerances shall be compensating so that the average grade and cross section specified are met. The finished surface must be free from segregation, tearing, and scarring, and have a uniform surface texture throughout the work limits.

301-8 FULL DEPTH RECLAMATION WITH CEMENT STABILIZATION (FDR-200)

301-8.1 Description. This rehabilitation alternative consists of pulverizing the existing asphalt concrete (AC) layer along with the underlying unbound material to a depth of 6, 9 or 12 inches per plan and specifications. The properties of this layer are considered to be similar to an Aggregate Subbase material with a modulus of at least 200 ksi.

The manufacture of the recycled base course shall be done in-place by pulverizing and blending the existing AC layer and base materials, if present, and adding cement. Micro-cracking of the completed cement stabilized surface is required before HMA is to be placed directly on top of the cement treated surface, regardless of the AC thickness. The process shall be accomplished in accordance with these specifications and conform to the lines and grades shown in the plans or as established by the engineer.

The cement content must be 2% by dry weight of FDR with cement with a dry unit weight of 130 lb/cu ft for 6” FDR section. The cement content must be 3% by dry weight of FDR with cement with a dry unit weight of 130 lb/cu ft for 9” FDR section. The cement content must be 4% by dry weight of FDR with cement with a dry unit weight of 130 lb/cu ft for 12” FDR section. Cement must be Type II or Type V Portland cement specified in ASTM C 150/150M.

301-8.2 Construction. The asphalt concrete surfacing and underlying base materials shall be pulverized such that 100 percent of the material will pass a two-inch sieve and a minimum of 90 percent will pass a one and one-half inch sieve. All materials other than rock and pulverized asphalt

concrete shall be broken up such that these materials will pass a one inch sieve. The pulverized materials shall be free of grass and vegetation, and construction debris to prevent contamination of the pulverized materials. Mixing shall continue until, and at the speed of the recycling unit adjusted to ensure, a homogenous mixture of the above materials and pulverized materials are achieved.

Trimming and disposal of excess material, if required, will be performed on the intimate mixture of pulverized asphalt concrete, base materials and subgrade soil. Excess pulverized material is the surplus that results after trimming and grading the pulverized pavement section to the lines and grades matching existing and/or per plans and specifications. Excess pulverized material shall consist of non-treated well mixed pulverized AC pavement and subgrade.

Do not start pulverized roadbed activities if the ambient air temperature is below 40F. If the ambient air temperature falls below 40F, you may only compact and finish pulverized roadbed. Before starting daily pulverized roadbed activities, sweep the pulverized roadbed area constructed the previous day to remove loose material.

301-8.3 Surface Preparation. Before pulverized roadbed activities start, prepare the existing roadway surface by:

1. Clearing foreign matter including vegetation
2. Removing standing water
3. Referencing the profile and cross slope
4. Marking the proposed longitudinal cut lines on the existing pavement as follows:
    4.1. Cut lines must coincide with points where the existing cross slope changes, approximately at the centerline and edge of traveled way
    4.2. Cut lines must indicate the sequence of the cuts
5. Referencing existing lane lines and striping layout

Final pavement surface shall slope away from the street centerline to a maximum of 3% grade. Pulverized material must be used as base material to meet new cross slope requirements. Native sub-grade material may need to be hauled off to allow for the use of all the pulverized base material. No additional compensation will be allowed for any sub-grade removal and haul-off if required. Any contaminated material will be removed and disposed of by the contractor off site at his expense. Any shortage of material, caused by premature disposal of the indicated surplus material by the contractor, shall be replaced by it and no additional compensation will be allowed for such replacement.

301-8.4 Spreading, Mixing, and Compacting. Do not use a heating device to soften the pavement. Remove any visible oversized materials in the pulverized roadbed mixture before shaping and compacting. If you encounter unstable subgrade or rocks greater than 4 inches in the roadway section, notify the Engineer. The Engineer determines the extent of the unsuitable material and the corrective measures to be taken.

Recycling shall be performed to the depth provided in the plans, while incorporating stabilizing agents, mineral filler, additional aggregate and water. Mixing shall continue until, and the speed

of the recycling unit adjusted to ensure, a homogenous mixture of the above materials and pulverized materials is achieved. Pre-cutting, grading and light compacting of the recycled material shall be performed prior to incorporation of the stabilizing. Spread cement uniformly over the full roadway surface width. Do not spread cement more than 30 minutes before mixing. Do not apply dry cement in windy conditions that will result in dust outside the FDR with cement area. The application rate must be the mix design rate or the ordered application rate in lb/sq yd ± 0.5 percent. The application rate of all stabilizing agents shall be continuously monitored. If the measured application rate falls outside the above tolerance, then the recycling operations shall be stopped and corrected before proceeding. Do not spread cement and aggregate before pulverizing.

Water must be injected through the pulverizing machine. The injection rate of mixing water must be sufficient to produce the FDR with cement material mixing moisture content. The water content of the stabilized material shall be monitored closely to ensure proper compaction. Mark where the center of the pulverizing drum stops. Start the following cut on this alignment at least 2 feet behind the mark. Before compacting, remove solids larger than 3 inches in any dimension by hand.

Immediately after pulverizing and mixing, compact FDR with cement to the minimum relative compaction. Do not allow more than 2 hours between final mixing of the pulverized material with cement and completion of initial compaction before trimming. During grading and final compaction add water to maintain the mixing moisture content as described in the mix design. Do not allow more than 2 hours to elapse from the time water is added to the aggregate and cement to completion of final compaction after trimming.

Longitudinal joints between adjacent stabilization passes shall be overlapped at least 4 inches. Transverse joints between the recycling process shall be saw-cut, if necessary, to provide a vertical clean face to ensure proper compaction. Compaction of cementitious stabilizer begins within 20 minutes after mixing and achieving gradation and moisture requirements.

According to the Section 301-2.3, the compaction shall always be commenced along the edge of the area to be compacted and the roller shall gradually advance toward the center of the area to be compacted. Rollers shall be operated along lines parallel or concentric with the centerline of the road being constructed, and no material variation therefrom will be permitted. All rollers must be maintained in good mechanical and working condition.

The relative compaction of each layer of compacted base material shall not be less than 95 percent. ASTM D2922, Methods of Density of Soil and Soil Aggregate in Place by Nuclear Methods, (or ASTM D1556). After compaction, the sub-grade shall be firm, and unyielding.

Construction joints shall have vertical faces and shall be made in thoroughly compacted material. Additional mixture shall not be placed against the construction joint until the joint has been approved by the Engineer. The face of the cut joint shall be lean and free of deleterious material and shall be kept moist until the placing of the adjacent FDR with cement.

301-8.5 Finishing. Once the entire working width (full lane width plus effected shoulder width) has been stabilized, and only after primary compaction has been completed, the entire working

width shall be graded to the required profile and cross-slope. Disturbance to the stabilized and primary compacted material shall be kept to a minimum during this grading and shaping operation.

The finished pulverized roadbed surface must not vary more than 0.05 foot from the lower edge of a 12-foot straight edge laid in directions parallel and perpendicular to the centerline. Variations within the above specified tolerances shall be compensating so that the average grade and cross section specified are met. The finished surface must be free from segregation, tearing, and scarring, and have a uniform surface texture throughout the work limits.

Immediately after compaction, apply water and roll with no vibration. The finished surface must be free of ruts, bump, indentations, segregation, raveling, and any loose material.

The completed cement treated subgrade shall be moist cured continuously until it is in a firm and unyielding condition. The cement treated subgrade shall be kept free from heavy traffic during the curing period or until the asphalt concrete surfacing is placed whichever is less, unless otherwise directed by the Engineer. Moisture curing shall be the only method of curing prior to micro-cracking.

Micro-cracking shall be performed with several vibratory roller passes 48 to 72 hours after finish grading to prevent severe, wide cracks from forming thus reduces the potential for reflective cracking through the HMA layer. Micro-cracking shall be performed before the application of asphaltic emulsion curing seal. After micro-cracking is complete additional moisture curing may be used. Any additional water required to achieve maximum density shall be applied by spraying the surface of the stabilized material with light applications. Care shall be taken so as not to over-apply additional water to any areas of the stabilized material.

While open to traffic and before placing HMA, maintain the FDR with cement surface free of ruts, bumps, indentations, raveling, and segregation. If FDR with cement material is damaged, it shall be repaired by removing and replacing the entire depth of affected layers in the damaged area. Feathering will not be permitted for repair of low areas.

Asphaltic emulsion curing seal must be applied on the completed cement treated base immediately before placing HMA. Asphaltic emulsion curing seal must comply with Caltrans Standard Section 94, Grade SS1 or CSS1. Dilute and thoroughly mix asphaltic emulsion for curing seal at a ratio of 1 part water to 1 part asphaltic emulsion. The water must no cause premature separation of the emulsion. Uniformly apply the diluted curing seal at a rate of 0.1 gal/yd2 of cement treated base surface.

SECTION 302 - ROADWAY SURFACING

302-4 SLURRY SEAL SURFACING.

302-4.3.1 General. – *Add the following paragraphs:*
All slurry mixing machines shall be equipped with a Fines Feeder for the adding of cement or granular Aluminum Sulfate.

Prior to the beginning of slurry operations, the Contractor shall furnish, at no cost to the City, current licensed weigh master's certificates indicating the net weight capacity of the aggregate bin. The Contractor shall provide a drive upon scale at the project site or an alternate site approved by the City. The drive on scale shall show the net weight of the aggregate bin on each slurry machine before the machine and product will be approved for applying slurry on the project.

All slurry machines are to carry, at all times, a calibrated emulsion measuring stick. The emulsion measuring stick is to be calibrated in 10-gallon increments to the slurry machine it is used on. Emulsion measuring sticks from other slurry machines will not be allowed to measure the gallons of emulsions on the slurry machines they were not calibrated to. The emulsion measuring stick is to have the slurry machine number or identification permanently marked on the stick. The gallons of emulsion are to be measured with a calibrated emulsion measuring stick and recorded before leaving and after returning to materials site. Use of a slurry machine will not be allowed if it does not have a calibrated emulsion measuring stick.

The Contractor shall furnish prior commencing work, a calibrated stick in 10-gallon increments to measure the oil in the trailer storage tanks in gallons. The measuring stick shall be calibrated to the trailer storage tank it is used on. The inspector shall check the oil in each load "in and out" and in the storage tanks at the beginning and end of each day to determine the amount of emulsion used for that day. Emulsion is not to be transferred from delivery tank to on-site storage tank before the City performs the sieve analysis on the emulsion. Aggregate used in the slurry shall not exceed a moisture content of four percent (4%) by weight of dry aggregate.

Contractor may not schedule more than 150 tons of slurry to be placed per day. Slurry may not be applied at more than 150 feet per minute.

The Contractor shall provide a self-propelled 10 ton pneumatic roller with a tire pressure of 50 PSI and equipped with a water spray system. The Contractor shall roll the required streets the same day they are slurried. The Contractor will be responsible for proper scheduling of the work such that the rolling can be properly done within the given time constraint. Failure to comply shall result in a $250.00/calendar day liquidated damage being assessed per incident. The cost of furnishing the roller and operator shall be included in the price paid for slurry seal.

The Contractor is hereby advised that City streets, parking lots, or other City-approved property will not be allowed as a site for stockpiling and batching. Arrangements for an acceptable site shall be the sole responsibility of the Contractor.

The Contractor shall sweep any raveled material on the street one (1) week after the initial placement. If the Engineer determines the raveling is excessive, the frequency of sweeping shall be adjusted to the field conditions of the raveling. If raveling continues within two (2) weeks of the initial placement, the street shall be swept and reslurried with a Type I mixtures (Local Streets) or a Type II (Arterial/Collector Streets) at no cost to the City. Raveling can be identified by the presence of "black pebbles" in the gutter.

The Contractor shall remove any and all weeds that are growing through cracks from the project street located within the pavement or growing between the concrete gutter and the pavement and spray a herbicide mixture of either Hyvar mixed with Roundup or Pramatol mixed with Roundup, or approved equal, at least fourteen (14) calendar days prior to slurrying. The herbicide mixture

shall contain Blazon, or approved equal, a purple dye to easily confirm the herbicide has been applied. The work shall be approved by the Engineer or his representative prior to slurrying. Full compensation for plant removal and herbicide treatment shall be considered as included in the unit cost for slurry seal.

Longitudinal joints must correspond with lane lines. You may request other longitudinal joint patterns if they do not adversely affect the slurry seal. Spread slurry seal in full lane widths. Do not overlap slurry seal between adjacent lanes more than 3 inches. Use a material, such as building paper at transverse joints and over previously placed slurry seal to prevent double placement. Remove the material after use. Use hand tools to remove spillage.

Full compensation for developing a water supply, for furnishing and placing all water required for work done in the Contract, including extra work shall be included in the prices paid for the various items of work requiring water; and no separate payment will be made therefore. The Contractor shall supply the City with licensed weighmaster's certificates of weight for all delivered aggregates to the job during the course of each day. Aggregate shall be delivered to the project only in the presence of a City representative. The Contractor shall also present weighmaster certificates for the amount of such aggregate remaining at the completion of the project at no cost to the City. Payment shall be determined by the amount that is physically placed, which cannot exceed the amount that is delivered to the job site with the certified weighmaster tickets. There shall be not outside work done utilizing materials from the tanks or stockpiles stored for the City's Contract.

Prior to storing aggregate on private property, the Contractor shall submit to the Engineer written permission from the property owner for such stockpiling.

Precautions shall be taken to ensure that stockpiles do not become contaminated with oversized rock, clay, silt, or excessive amounts of moisture. The stockpiles shall be kept in areas that drain readily. Segregation of the aggregate will not be permitted.

The Contactor shall protect the wet slurry from traffic at all times and if damaged or defaced, the Contractor shall repair said damage at no additional cost to the City.

The placement of slurry seal may be suspended with the concurrence of the Engineer due to unsuitable weather, temperature conditions, or other conditions that are considered unfavorable for the prosecution of the work. The Contractor shall immediately comply with the order of suspension by the Engineer, and work shall not be resumed until authorized by the Engineer.

302-4.8 Spreading and Application. - *Add the following paragraphs:*
Prior to applying slurry seal, the Contractor shall clean, to the satisfaction of the Engineer, the street surface with a power sweeper, remove all R.P.M.'s, abrasive grind or sandblast completely all lane lines, street legends, crosswalks or other painted or thermoplastic surfaces. This is necessary to provide a good bonding surface for the slurry seal, as well as eliminate "ghosting" of the old striping and markings as the new slurry wears off over time.

It is anticipated that nuisance water, such as storm water runoff and irrigation water, will run in and across the right-of-way at various time throughout the period of construction. It shall be the responsibility of the Contractor, at their own expense, to provide for and protect the work from such water. In addition, the Contactor's responsibility shall include handling nuisance waters such that their operations do not cause them to damage existing improvements or properties adjacent to or near the site of work.

Slurry shall not be applied when the atmospheric temperature is less than 65°F (18°C).

The application of slurry shall not commence until after 8:00 a.m., and shall conclude at 1:30 p.m. unless other authorized by the Engineer. The slurry shall be sufficiently cured to be open to traffic by 4:00 p.m. The portions of streets to be slurried shall be closed from the time the application begins until the mixture as achieved sufficient set to be opened to traffic.

The slurry shall be applied in such a manner that no ripples or waves exist. If ripples or waves occur in the slurry during the application, the work shall cease and the Contractor shall correct the situation. The Contractor may use a drag to knock down ridges. If ripples or waves are not corrected to the Engineer's satisfaction, the street shall be reslurried at the Contractor's expense.

The Contractor shall, at the direction of the Engineer, repair the reseal to the entire street, or complete section thereof, as determined by the Engineer, which have not been sealed properly (includes areas that have failed to meet yield and mix design specifications) and completely. No compensation will be provided for slurry seal used in repair and reseal work.

Each slurry crew shall be composed, at a minimum, of a coordinator at the project site at all times, a competent quick-set mixing man, a competent driver, two squeegee men, and sufficient laborers for any handiwork and cleanup.

Surface oil and grease shall be removed or sealed with shellac or an equivalent material approved by the City before the application of the slurry seal. Full compensation for surface oil and grease removal shall be considered as included in the unit cost for slurry seal.

The Contractor shall roll all cul-de-sacs (the last 250' minimum), the last 250' of dead-end streets and knuckle curves. Full compensation for rolling the slurry shall be considered as include in the unit cost for slurry seal.

During slurry seal operations, it shall be the Contractor's responsibility to place protective covering over, or to otherwise avoid slurry seal coating of manholes, utility covers, pavement markers (reflective and non-reflective), concrete gutters, concrete cross gutters, and drainage facilities, survey monuments and remove said covering and/for slurry seal coating after slurry sealing has been completed.

The start and finish of slurry application shall be a straight line which, unless otherwise approved by the Engineer, shall be obtained by laying a strip of building paper or other material approved by the Engineer on the pavement surface. After application of slurry, the paper is to be removed leaving a straight edge. The entire street surface area shall be sealed the same day.

302-4.8.1 Crack Sealing and Filling. Crack sealing shall be performed prior to the Slurry Seal application. Pavement cracks 1/4" wide and larger shall be sealed. Pavement cracks 1/8" to 1" wide shall be cleared of all loose particles of dust, dirt and laitance with oil-free compressed air immediately preceding the sealing operation. Cracks shall be routed out as necessary to provide a reservoir for the sealer that will have a depth of l" to 1 1/2".

The crack sealing material shall be a hot-applied asphalt (Crafco Polyflex or approved equivalent). The crack sealing material must not be modified or diluted in any way. Pavement cracks larger than 1" wide shall be filled with the mixtures per Specification Section 203-6.4 Type E (Extra Fine).

A wand and nozzle type application shall be used to fill all cracks with crack sealing material. Crack sealing material shall be applied in two applications with the possibility of additional applications to fill the crack within the allowable tolerance. The cracks must be filled to the surface and not overfilled or applied to the top of adjoining pavement or concrete surfaces. The cracks shall be squeegee immediately after the sealant has been applied to insure conformity with the pavement surface.

The crack sealing material shall then be allowed to penetrate and sink into the crack area for a minimum of one hour. Each crack must then have a second application of crack sealer material applied in the crack area only to within + 0.01' of the adjoining pavement surface. If the material is a cold-applied, polymer modified petroleum emulsion, sand will be applied over the crack sealing material after the second application, covering a minimum of 1 1/2 inches each side of the crack and not more than 3/4 inch higher than the top of the pavement. The contractor shall be responsible for the removal of all excess sand which shall be removed within three hours after being applied.

302-5 ASPHALT CONCRETE PAVEMENT.

302-5.1 General. - *Add the following paragraphs:*
Asphalt concrete pavement structural sections equal to or greater than 3 inches (76 mm) in thickness shall be installed in two lifts. Base course aggregate material size shall be ¾ inch (19 mm) and cap course aggregate material size shall be ½ inch (13 mm). All pavement shall be placed over 4 inches of crushed aggregate base, unless compacted to 95% relative compaction.

All valves within project limits in the public right-of-way shall be raised to finish grade as a part of this work. The Contractor shall furnish and install new can or slip can materials as necessary. If new water valve lids are necessary, they shall be supplied by the Municipal Utilities and Engineering Department. All valve can lids within the project limits in the public right-of-way shall be painted the appropriate color for the utility they represent (ie. Water - Blue, Gas - Yellow, Fire – Red, etc.).

302-5.2 Timeline of Paving Operations.
All paving operations shall follow the timeline and requirements shown below unless otherwise approved by the City:

PAVING TIMELINE				
DESCRIPTION OF WORK	**TIME PERIOD**			
	WEEK 1 (DAY 1-7)	**WEEK 2 (DAY 8-14)**	**WEEK 3 (DAY 15-21)**	**WEEK 4 (DAY 22-28)**
PAVING (START TO FINISH) (1)				
CURE PERIOD (2)				
MANHOLE ADJUST TO GRADE (3)				
STRIPING & PAVEMENT MARKINGS (4)				
TRAFFIC LOOPS (5)				
NO PARKING SIGNS ALLOWED (6)				

Note: All time periods shown above are the maximum amount of allowable time for each activity. This timeline does not apply to the installation or repair of curb and gutter, ac dikes, sidewalks, cross gutters, curb ramps, driveway approaches or truncated domes.

(1) In no case shall any street segment remain unpaved longer than three calendar days if no other work activity is being performed on that street segment. Any deviation from the timeline shall result in a penalty assessment of $1,000 per calendar day.
(2) No work except cat tracking of proposed striping is allowed during this period; therefore "No Parking Signs" shall not be installed during this activity.
(3) Once each manhole is exposed, all associated work to adjust it to grade must be completed within 48 hours. This shall include all adjustments of manholes, vaults, valve cans, etc. as required by the Contract.
(4) All cat tracking and approval of proposed striping shall occur during the cure period.
(5) Traffic loops must be installed after the approval of striping layout and prior to the installation of thermoplastic striping and pavement markings.
(6) "No Parking Signs" shall be installed per Section 7-19 of these specifications.

302-5.4 Tack Coat. – *Delete and replace with the following:*
If the asphalt concrete pavement is being constructed directly upon an existing hard-surfaced pavement, a tack coat of High Performance Seal (HPS) No-Track Tack at an approximate rate of 0.05 gallon per square yard shall be uniformly applied upon the existing pavement preceding the placement of asphalt concrete. The surface shall be free of water, foreign material, or dust when the tack coat is applied. To minimize public inconvenience, no greater area shall be treated in any one day than is planned to be covered by asphalt concrete during the same day, unless otherwise approved by the Engineer.

302-5.5 Distribution and Spreading. – *Add the following:*
Unless otherwise permitted by the Engineer, the top layer of asphalt concrete for shoulders, tapers, transitions, road connections, private drives, curve widening, turnouts, left-turn pockets, and other such areas, shall not be spread before the top layer of asphalt concrete for the adjoining through lane has been spread and compacted. At locations where the number of lanes are changed, the top layer for the through lanes shall be paved first. Tracks or wheels of spreading equipment shall not be operated on the top layer of asphalt concrete in any area until final compaction has been completed or unless directed by the Engineer.

All screed extensions for paving machines shall be provided with a tamper, roller, or other suitable compacting devices.

Asphalt pavers shall be equipped with automatic screed controls and a sensing device or devices. Automatic grade and slope control shall be used for overlays.

All joints shall be sealed after rolling.

When placing asphalt concrete to the lines and grades noted in the plans or as approved by the Engineer, the automatic screed controls shall control the longitudinal grade and transverse slope of the screed. Grade and slope references shall be furnished, installed, and maintained by the Contractor. The Contractor shall use a ski device, the minimum length of the ski device shall be 30 ft. The ski device shall be a rigid one-piece unit and the entire length shall be utilized in activating the sensor. The Contractor may use a laser to control the screed.

When placing the initial mat of asphalt concrete on existing pavement, the end of the screed nearest the center line shall be controlled by a sensor activated by a ski device not less than 30 ft long. The end of the screed farthest from center line shall be controlled by an automatic transverse slope device set to reproduce the cross slope approved by the Engineer.

When paving contiguously with previously placed mats, the end of the screed adjacent to the previously placed mat shall be controlled by a sensor that responds to the grade of the previously placed mat and will reproduce the grade in the new mat within a 0.01 ft. tolerance. The end of the screed farthest from the previously placed mat shall be controlled in the same manner as when placing the initial mat.

Should the automatic screed controls fail to operate properly during any day's work, the Contractor may use manual control of the spreading equipment for the remainder of that day; however, the equipment shall be corrected or replaced with alternative automatically controlled equipment conforming to the requirements in this section before starting the next day's work.

Should the methods and equipment furnished by the Contractor fail to produce a layer of asphalt concrete conforming to the requirements, including straightedge tolerance, of Subsection 302-5.6.2 - Density and Smoothness, of the Standard Specifications, the paving operation shall be discontinued and the Contractor shall modify his equipment or furnish substitute equipment. A

drop-off of more than 0.15 ft will not be allowed at anytime between adjacent lanes open to public traffic.

The Contractor shall schedule his paving operations such that each layer of asphalt concrete is placed on all contiguous lanes of a traveled way each work shift. At the end of each work shift, the distance between the ends of the layers of asphalt concrete on adjacent lanes shall not be greater than 10 ft. nor less than 5 ft. Additional asphalt concrete shall be placed along the transverse edge at the end of each lane and along the exposed longitudinal edges between adjacent lanes, hand raked, and compacted to form temporary conforms. Kraft paper, or other approved bond breaker, may be placed under the conform tapers to facilitate the removal of the taper when paving operations resume.

302-5.6.1 General. - *Add the following paragraph:*
All asphalt concrete pavement abutting portland cement concrete gutters shall match and be flush with the gutter lip when finish rolling is complete.

302-5.6.2 – Density and Smoothness. *– Delete and replace with the following:*
The completed surfacing shall be thoroughly compacted, smooth and free from ruts, humps, depressions or irregularities. Any ridges, indentations or other objectionable marks left in the surface of the asphalt concrete shall be eliminated by rolling or other means. The use of any equipment that leaves humps, ridges, irregularities or other objectionable marks in the asphalt concrete shall be discontinued, and acceptable equipment shall be furnished by the Contractor.

The finished surface shall meet the following smoothness criteria:

- When a 12 foot long straightedge is laid on the finished surface parallel to the centerline of the roadway, the finished surface shall not vary from the edge of the straightedge more than 0.05 feet, except at changes in grade,
- When a 12 foot long straightedge is laid on the finished surface perpendicular to the centerline of the roadway and extends from edge to edge of a traffic lane, the finished surface shall not vary from the edge of the straightedge more than 0.05 feet, except at changes in grade.

If the top layer of pavement does not comply with the smoothness specifications shown, remove and replace the entire section or complete a grind and overlay of 1.5 inches or 3 times the aggregate size, whichever is greater. Grind and overlay will be considered as a repair method only when the thickness of the asphalt pavement section is greater than 1.5 inches following the required grinding. Corrected section shall be rectangular to the nearest pavement edge or lane line and to a crosswalk, concrete spandrel or other limits approved by the City. Do not begin corrective actions until the method and limit of correction is authorized by the City. If the tolerances cannot be achieved by the methods described above, the contractor must re-pave the street section, in kind, at their own expenses.

The compaction after rolling shall be a minimum of 91 percent and a maximum of 97 percent of the density obtained on samples compacted with the California Kneading Compactor per California Test 304. Cores will be taken randomly by the City for laboratory testing per California Test 308, Method A at a frequency of three per lot. A lot shall consist of a maximum of 3,000 square yards of asphalt concrete and will be identified in the field by the City. The cores will be

averaged to determine the percent of maximum theoretical density, as determined by ASTM D-2041, per lot to the nearest tenth of a percent.

Reduced payment factors for percent of maximum theoretical density will be per the following table, and will be applied to the entire lot sampled.

Reduced Payment Factors for Percent of Maximum Theoretical Density

Asphalt Concrete percent of maximum theoretical density	Reduced payment factor	Asphalt Concrete percent of maximum theoretical density	Reduced payment factor
91.0	0.0000	97.0	0.0000
90.9	0.0125	97.1	0.0125
90.8	0.0250	97.2	0.0250
90.7	0.0375	97.3	0.0375
90.6	0.0500	97.4	0.0500
90.5	0.0625	97.5	0.0625
90.4	0.0750	97.6	0.0750
90.3	0.0875	97.7	0.0875
90.2	0.1000	97.8	0.1000
90.1	0.1125	97.9	0.1125
90.0	0.1250	98.0	0.1250
89.9	0.1375	98.1	0.1375
89.8	0.1500	98.2	0.1500
89.7	0.1625	98.3	0.1625
89.6	0.1750	98.4	0.1750
89.5	0.1875	98.5	0.1875
89.4	0.2000	98.6	0.2000
89.3	0.2125	98.7	0.2125
89.2	0.2250	98.8	0.2250
89.1	0.2375	98.9	0.2375
89.0	0.2500	99.0	0.2500
< 89.0	Remove and replace	> 99.0	Remove and replace

In addition to the reduced payment factors below, all costs associated with the testing of the lot which resulted in values outside of the 91-97 percent range, will be withheld from the final payment due to the Contractor.

Following completion of the testing by the City, the core locations within the asphalt pavement shall be repaired by the Contractor.

302-5.6.3 Tracking. All areas receiving asphalt pavement shall be protected from tracking onto adjacent areas. Do not allow traffic on new asphalt pavement until its mid-depth temperature is below 140º Fahrenheit to minimize the tracking.

A rock dust blotter coat per Section 302-9.7 or a sand coat at a rate of 1-2 pounds per square yard shall be applied to the compacted surface for all areas where tracking is a concern. The application of tracking prevention measures shall be determined by the Contractor.

A haul route for all paving operations shall be reviewed and approved by the City prior to the start of any construction activity. No deviations from the approved haul route shall occur unless approved in writing from the City.

All tracking onto adjacent streets, striping or pavement markings shall be the responsibility of the Contractor. All striping and pavement markings shall be removed and replaced in kind by sandblasting. All tracking onto roadway surfaces may require the use of a street sweeper to the satisfaction of the City.

302-5.7 Joints. – *Add the following:*
Longitudinal joints shall be trimmed to a vertical face and to a neat line if the edges of the previously laid surfacing are, in the opinion of the Engineer, in such condition that the quality of the completed joint will be affected. Longitudinal and transverse joints shall be tested with a 12' straightedge and shall be cut back as required to conform to the provisions in Subsection 302-5.6.2 Density and Smoothness for surface smoothness. Connections to existing surfacing shall be feathered to conform to the provisions for smoothness.

Longitudinal joints in the top layer shall correspond with the edges of proposed lane striping. Longitudinal joints in all other layers shall be offset not less than 0.5' alternately each side of the edges of traffic lanes.

All feathered joints shall be sealed after rolling.

302-5.9 Measurement and Payment. – *Add the following:*
Reduced payment factors per 302-5.6.2 will be applied to the Contract Unit Price for lots with a Maximum Theoretical Density less than 91.0 and greater than 97.0 percent.

302-5.10 Hot Asphalt Leveling Course. Areas to receive the Hot Asphalt Concrete Leveling Course shall be determined and defined by the project manager and inspector, and identified to the Contractor in the field. Mix for hot Asphalt Concrete Leveling Course shall be 1/2 inch aggregate, C2, as defined in Section 203-6.4.3.

Areas to receive hot asphalt concrete leveling course shall be areas located near or adjacent to existing curbs and/or gutters that are potholed, or have the lip of gutter higher than the adjacent roadway. Potholes, large cracks, or ruts shall be filled to the surrounding grade elevation and compacted. Hot Asphalt Concrete Leveling Course shall be completed prior to the placement of Type II Slurry Seal, ARAM or resurfacing.

Prior to placement of asphalt concrete, the surface shall be cleaned and all debris and deleterious materials shall be removed. A tack coat meeting the material and application requirements of Section 302-5.4 Tack Coat, shall be applied prior to placement of hot mix asphalt concrete.

302-5.11 Asphalt Pavement Crack Sealing and Filling. Crack sealing shall only be performed as a repair method for conventional hot mix asphalt pavement (HMA) and not installed at project locations which will have asphalt rubber hot mix (ARHM) used as the overlay material. Crack

sealing shall be performed after milling of existing asphalt surface and prior to any leveling course, if necessary.

Right after milling of existing asphalt and before crack sealing or filling, Contractor shall remove any and all weeds that are growing through cracks from the project street located within the pavement or growing between the concrete gutter and the pavement and spray a herbicide mixture of either Hyvar mixed with Roundup or Pramatol mixed with Roundup, or approved equal, at least seven (7) calendar days prior to paving. The herbicide mixture shall contain Blazon, or approved equal, a purple dye to easily confirm the herbicide has been applied. The work shall be approved by the Engineer or his representative prior to paving. Full compensation for plant removal and herbicide treatment shall be considered as included in the unit cost for paving.

The crack sealing material shall be a hot-applied asphalt (Crafco Polyflex or approved equivalent). The crack sealing material must not be modified or diluted in any way. Pavement cracks larger than 1" wide shall be filled with the mixtures per Specification Section 203-6.4 Type E (Extra Fine).

A wand and nozzle type application shall be used to fill all cracks with crack sealing material. Crack sealing material shall be applied in two applications with the possibility of additional applications to fill the crack within the allowable tolerance. The cracks must be filled to the surface and not overfilled or applied to the top of adjoining pavement or concrete surfaces. The cracks shall be squeegee immediately after the sealant has been applied to insure conformity with the pavement surface.

The crack sealing material shall then be allowed to penetrate and sink into the crack area for a minimum of one hour. Each crack must then have a second application of crack sealer material applied in the crack area only to within + 0.01' of the adjoining pavement surface. If the material is a cold-applied, polymer modified petroleum emulsion, sand will be applied over the crack sealing material after the second application, covering a minimum of 1 1/2 inches each side of the crack and not more than 3/4 inch higher than the top of the pavement. The contractor shall be responsible for the removal of all excess sand which shall be removed within three hours after being applied.

SECTION 303 - CONCRETE AND MASONRY CONSTRUCTION

303-1 CONCRETE STRUCTURES.

303-1.1 General. - *Delete the first sentence of paragraph 1 and replace with the following:*
"Concrete bridges, culverts, catch basins, retaining walls, abutments, piers, footings, foundations, drainage inlets, head walls, end walls, wing walls, junction structures, transition structures, manholes, and other similar types of portland cement concrete structures shall be constructed to the lines and grades in conformity with the Plans and Specifications.

303-5 CONCRETE CURBS, WALKS, GUTTERS, CROSS GUTTERS, ALLEY INTERSECTIONS, ACCESS RAMPS, AND DRIVEWAYS.

303-5.1.1 General. - *Replace the last paragraph with the following:*

No PCC shall be ordered and/or placed until the forms and subgrade have been inspected and approved by the Engineer in the field.

All pull boxes, water meter boxes, and water valve covers shall be adjusted to proposed finish grade and approved by the Engineer in the field prior to placement of the PCC.

The Contractor shall barricade and protect placed PCC from all damage, marks, mars, and/or graffiti. Any PCC damaged, defaced, discolored, or defective shall be replaced at the Contractor's expense.

When removals of curb and/or sidewalk are located at curb return, the Contractor shall install access ramps. The Contractor is to construct all access ramps in accordance with American Disability Act (ADA) Standards/California Code of Regulations Title 24 – Accessibility Regulations. If the ramps constructed by the Contractor are found to be in non-compliance with ADA Standards, the Contractor will be required to remove and replace the ramps to ADA Standards at the Contractor's expense.

303-5.1.2 Drainage Outlets Through Curb. - *Add the following paragraph*:
Coring shall be required for all drains through existing curbs.

303-5.1.3 Driveway Entrances. – *Replace the last paragraph with the following:*
Driveway approaches where required, shall be 150 mm (6") thick for single-family residential area, and 200 mm (8") thick for commercial driveway approaches.

303-5.1.4 Walk. The back of sidewalk shall be 2 inches from the street Right-of-Way line unless otherwise specified by the Engineer.

Included in the price of sidewalk construction are retaining curbs. Retaining curbs are needed to retain soils from sloughing and eroding onto the finished sidewalk surface, as a result of grade differentials from existing ground surface to proposed sidewalk surface. Retaining curbs shall be installed when the finished surface is lower than the surrounding grade by 3 inches vertically within 6 inches horizontally. If the vertical difference in elevation is less than 3 inches, the surrounding grade shall be sloped, maximum 2:1 slope, to match the finished elevation. The height of the retaining curb shall be to the height of the existing grade it is retaining. Retaining curbs shall be located within the City's right-of-way at all times.

303-5.1.5 Access Ramps. Construction of curb ramps shall conform to the Type and Case appropriate for the condition, as specified on the plans and as shown within the 2012 Standard Plans for Public Works Construction, Plan 111-5. The Contractor shall be responsible to layout the proposed access ramp to comply with the maximum slope indicated on the plans or Standard Plan 111-5. The maximum slope for the ramp shall not be exceeded unless otherwise approved in writing by the Engineer. The Contractor shall remove and replace access ramps deemed non-compliant with the plans or Standard Plan 111-5.

For proposed locations adjacent to a cross gutter spandrel, sawcuts along the radius of the curb will not be allowed. The spandrel shall be replaced from expansion joint to expansion joint to the extents of the curb removal. For proposed locations adjacent to curb and gutter, sawcuts along the flowline of the curb will not be allowed. The entire curb and gutter shall be replaced from expansion joint to expansion joint as required. Sawcuts at locations other than the expansion joint

will not be allowed unless approved by the Engineer. Curb cuts of the existing curb will not be permitted for installation of proposed ramp. Any deviation from these requirements will result in rejection of all work at this location and shall not be included in progress payment requests until corrected, per direction from the Engineer.

The Contractor shall verify the extents of sawcut and removal for each access ramp taking into account the maximum slope and transition area required. It shall be the Contractor's responsibility to identify required removal limits, set concrete forms and verify maximum slopes are not exceeded. The Engineer shall be present to verify the concrete forms prior to the placement of the concrete at each location, however this does not alleviate the responsibility of the accuracy of forms or slopes of the access ramp from the Contractor.

Included in the price of access ramps are retaining curbs. Retaining curbs are needed to retain soils from sloughing and eroding onto the finished ramp surface, as a result of grade differentials from existing ground surface to proposed ramp surface. Retaining curbs shall be installed when the finished surface is lower than the surrounding grade by 3 inches vertically within 6 inches horizontally. If the vertical difference in elevation is less than 3 inches, the surrounding grade shall be sloped, maximum 2:1 slope, to match the finished elevation. The height of the retaining curb shall be to the height of the existing grade it is retaining. Retaining curbs shall be located within the City's right-of-way at all times.

Access Ramps shall have truncated domes installed in accordance with standard plans and specifications. Truncated domes on new access ramps shall be Armor-Tile, Cast in Place System, Equal Tile, or approved equal. Truncated domes installed on existing surfaces shall be Safety Sted TD, or approved equal. Truncated dome panels shall be 36"x48", inline configuration, with a spacing of 2.35" on center, and Federal Yellow in color.

The access ramp work shall include all related adjustments of pull boxes, pull box covers, signs, and protection of any underground utilities within the work area. The removal and replacement of up to 5 linear feet of sidewalk on each side of the access ramp shall be included within the cost of the access ramp. The removal and replacement of the sidewalk will allow for transition from the top of ramp to adjacent sidewalk and will be utilized as necessary.

303-5.4.3 Weakened Plane Joints, (a) General. - *Add the following paragraph:*
All weakened plane joints shall be spaced at a maximum of 3.05 m (10') feet for curbs, gutters, and sidewalks. Scoring lines shall conform to those prevailing in the area and be uniform in spacing.

303-5.5.2 Curb. - *Replace the first paragraph with the following:*
PCC for curb and gutter shall be placed within three working days from removal of the existing PCC curb and gutter. The curb and gutter surface shall not vary more than 3 mm (0.01') from a 3 m (10') straightedge except at the grade changes. Prior to the removal of the forms, the surface shall be finished true to grade by means of a straightedge float of not less than 3 m (10') in length, and operated longitudinally over the surface of the concrete. Form clamps shall be constructed so as not to interfere with the operation of the float. The form on the front of the curbs shall not be removed less than one (1) hour, nor more than six (6) hours after the concrete has been placed. In no event shall forms be removed while the concrete is sufficiently plastic to slump. The top and

face of the finished curb shall be true and straight, and top surface of curbs shall be of uniform width, free from humps, sags, blemishes, or other irregularities.

303-5.5.3 Walk. - *Add the following paragraphs:*
The sidewalk surface shall not vary more than 5 mm (0.02') from the 3m (10') straightedge except at grade changes, and the finished surface shall be free from humps, sags, blemishes or other irregularities. All sidewalks shall be a minimum of 100 mm (4") thick, except at driveways where the sidewalks shall be a minimum of 150 mm (6") thick for single family residential areas and 200 mm (8") thick for all other areas.

303-5.6 Curing. - *Add the following paragraph:*
Curing compound shall be translucent with red fugitive dye, Type 1, in accordance with Section 201-4 Concrete Curing Compound, of the Standard Specifications.

303-5.7 Repairs and Replacements. - *Add the following paragraphs:*
In order to minimize vandalism damage to the finished PCC surfaces, the Contractor shall plan his work so that no PCC is poured after 1:00 p.m., unless otherwise authorized by the Engineer in the field.

The Contractor shall barricade and protect placed Portland Cement Concrete from all damages, marks, mars, and/or graffiti. Any Portland Cement Concrete damaged, defaced, discolored, or defective shall be replaced to the satisfaction of the Engineer at the Contractor's expense, and no additional time will be allowed.

Grading, patching, or other remedies to correct the situation will not be accepted unless in the opinion of the Engineer the vandalized area is so small that it does not warrant replacement. Concrete replacement areas shall be from score mark or control joint to score mark or control joint, and full width of the sidewalk. All replacement areas shall be saw cut.

303-5.8 Backfilling and Cleanup. - *Add the following paragraph:*
A minimum of 300mm (12”) wide full depth asphalt concrete pavement repair patch and an 450mm (18”) wide 1-1/2” deep grind outside of the trench width is required when cross gutter, spandrel, driveways, curb and gutter is placed adjacent to existing asphalt concrete pavement. The asphalt concrete pavement repair patch shall be placed within two (2) working days after the cross gutters, spandrels, driveways, curb and gutter are replaced. The asphalt concrete pavement shall be sawcut. All work shall be in accordance with the General Permit Conditions and Trench Specifications, latest edition.

SECTION 304 - METAL FABRICATION AND CONSTRUCTION

304-3 CHAIN LINK FENCE.

304-3.4 Measurement and Payment. - *Delete paragraph 1 and replace with:*
Chain link fence will be measured along the horizontal projection line of the completed fence, deducting the widths of gates and openings.

SECTION 314 - TRAFFIC STRIPING, CURB AND PAVEMENT MARKINGS, AND PAVEMENT MARKERS

314-1 GENERAL. - *Add the following paragraphs:*
To insure the protection of storm drain inlets, Best Management Practices (BMPs) shall be employed during all striping operations. Refer to Section 7-8.6.

Each storm drain catch basin or storm drain inlet box shall be marked "NO DUMPING - FLOWS TO CREEK." Two coats of paint are required. Stencil shall match City's stencil. Paint and painting shall comply with the specifications.

All street resurfacing work shall include installing fire hydrant pavement markers at all fire hydrant location, whether the pavement markers were existing or not. The pavement markers shall be Type I – Two-Way Blue Retroreflective per Section 214-6 of the Specifications and installed per City's detail drawing No. 102-0. All work associated with the installation of all new, or replacement of existing, fire hydrant pavement markers shall be included as noted within the specifications.

314-4 APPLICATION OF TRAFFIC STRIPING AND CURB AND PAVEMENT MARKINGS.

314-4.1 General. – *Add the following paragraphs:*
During construction, if traffic legends or lane striping are removed or paved-over for any reason, they shall be replaced immediately with temporary traffic legends or lane striping as directed by the City, and the Contractor shall place permanent traffic legends or lane striping at the end of the job or on completion of final paving. When permanent items are placed, they shall be complete markings, legends, or striping i.e.: if limit lines are disturbed, they shall be replaced to centerline or from curb to curb, whichever was existing; if a letter in a word is removed or covered, the entire word shall be replaced; and lane striping shall extend 75 feet beyond construction limits. All replacement markings, legends, or striping required to be replaced beyond the contract limits shown shall be at the cost of the Contractor and shall meet City standards. If existing striping or legends are to be removed on existing surfaces, they shall be sandblasted. Painting over striping or legends in lieu of removal will not be permitted. Pavement striping shall comply with the applicable provisions of Sections 214 and 314 of the Standard Specifications.

Where side streets with existing striping, markings and markers are encountered, striping, markings and markers shall be repainted and replaced for a minimum distance of 15 m (50 feet) from the crosswalk, stop bar or limit line.

314-4.2 Control of Alignment and Layout.

314-4.2.1 General. - Delete and replace with t*he following:*
The Contractor will be responsible for all layout of all striping. All striping, markings and markers shall be reinstalled in their existing locations unless otherwise shown on the plans. The Contractor shall be responsible to take appropriate measures and record the existing locations.

The Contractor shall verify all dimensions in the field prior to installation of pavement striping/marking layout (Cat-Track). Should field measurements differ from the plan, the Contractor shall immediately notify City staff. No Cat-Track marks shall be placed until discrepancies are resolved.

Cat-Track must be approved by City staff prior to the installation of permanent pavement striping/marking. Contractor shall notify City staff a minimum of 24 hours prior to installation of permanent pavement striping/marking to allow for inspection and approval. If approval of Cat-Track is not obtained by the Contractor, all work required to correct the striping/marking will be at the expense of the Contractor

Cat-Track marks shall be made in chalk. Paint for the purpose of Cat-Track is prohibited. If paint is used, the Contractor must remove the paint without damaging or visually deforming the pavement surface. If damage or visual deformity within the removal area occurs, in the opinion of City staff, the Contractor shall grind and overlay the entire segment with no additional compensation. The area of the grind and overlay shall be as required by City staff and shall be a minimum of 0.10' thickness.

All visible Cat-Track markings after the installation of the permanent striping/marking shall be removed without damage or visual deformity to the pavement surface. Any damage or visual deformity to the pavement shall be remedied as noted above.

314-4.3.5 Application. - *Amend the first sentence in paragraph 8 as follows:*
"Glass beads shall be applied at a rate of 0.6 to 0.8 kg of beads per liter (5 to 7 pounds of beads per gallon)."

314-6 GREEN BIKE LANE. Green bike lanes shall be installed per plan and conform to the technical specifications included within the contract documents and shall be Streetbond CL or approved equal.

City of Redlands Standard Specifications

CDM Smith

GENERAL REQUIREMENTS

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SECTION 01110 COORDINATION OF WORK

A. Maintenance of Operation of Existing Facilities

This project is intended to be constructed during phases. The City reserves the right to award any or all phases of the work at one time. Follow the project phasing directions below.

If work for a subsequent phase is awarded separately, the Contractor will receive updated information including record drawings from the prior phase(s) of construction.

B. Construction Phase Sequence

1. The work is organized into the following phases:

    a. Phase 1 involves construction of the office expansion and relocation of administrative staff, including flex space for laboratory technicians.

    b. Phase 2A includes renovation of the west side of the existing laboratory for microbiology, media preparation, and instrumentation functions, while maintaining operation of the east lab.

    c. Phase 2B will shift all lab operations to the renovated west lab to allow for renovation of the east lab.

Refer to the contract drawings for detailed information and sequencing requirements related to project phasing.

Construction phase sequence to allow continuous operation of all testing except for microbiology lab. Testin services will be sent to third-party vendor when required to maintain verifiable clean environment.

Temporary parking to be arranged by the client for their own staff during construction.

C. Coordination Submittals

1. The contractor shall submit a Connection Plan to the City for review and approval. The plan should contain pothole information for the existing water, sewer, power and communication lines to be connected to, any required deviations from the plan, schedule of connections and any phasing for the locations and connections.

2. No water system shutdowns will be allowed on Monday or Friday, unless otherwise directed by City staff.

3. When approved, City will begin shutting down the water system to allow connection at 8:00 AM. Note the system drainage time may take up to two hours depending on location and field conditions.

D. Special Considerations (NOT USED)

END OF SECTION

SECTION 01112 DESCRIPTION OF WORK

PART 1 - GENERAL

1.1 SUMMARY

A. The work to be done under this Contract includes the furnishing of project management, labor, materials, tools and equipment for the construction of the Joint Utilities Laboratory Building Renovation And Expansion Project, Phase 1for the City of Redlands, all in accordance with the Contract Documents.

B. The following contract drawings are made a part of these Contract Documents:

Title	Sheet No.
Title Sheet & Vicinity Map	1
General Notes, Symbol Legend and Details, CALgreen checklist	2-7
Civil sheets	8-11
Architectural sheets	12-57
Structural sheets	58-69
Building Mechanical sheets	70-97
Fire protection sheets	98-103
Electrical sheets	104-124

1.2 GENERAL SCOPE OF WORK

A. Work In This Contract: Work in this Contract includes all labor, materials and equipment necessary for construction of Joint Utilities Laboratory Building Renovation And Expansion Project – Phase 1 as noted on the Contract Drawings and all other Contract Documents and is summarized as follows:

1. The Work shall consist of construction of a new building addition to expand the existing laboratory facility, providing new office space for administrative staff and flexible workspace for laboratory technicians. Supporting work includes associated site demolition, sidewalk improvements, and accessible path upgrades. Utility work includes relocation of existing site utilities, including laboratory gas supply tanks and associated piping to the north side of the mechanical room, and installation of new 4-inch sanitary drainage piping connected to the existing site sanitary system to serve the new building addition and new unisex restroom. Electrical work includes coordination with the Owner to provide a temporary Motor Control Center (MCC) to maintain power to all existing loads on MCC-OB from the future temporary MCC in Phase 2; installation of a new underground electrical ductbank; installation of a new circuit breaker in the existing MCC-OB to feed new panelboard LP-D, including a temporary feeder and step-down transformer XFMR-D; and installation of a new panelboard LP-OL and step-down transformer XFMR-OL within the existing electrical room. Additional

architectural modifications include sealing the existing mechanical room door and constructing a new door, as well as reroofing and reinsulating the existing building.

2. The Contractor shall, upon completion of the building construction and renovations required herein, initially operate all components of the Contract Work furnished and installed by Contractor, and make any additional adjustments, corrections, repairs, replacements, and reconstructions necessary to provide the City with complete, correctly operating pipeline and appurtenances.

END OF SECTION

SECTION 01200 MEASUREMENT AND PAYMENT

A. Work Listed in the Schedule of Work Items

1. The application for payment will be for a specific item based on the percentage completed or quantity installed. The percentage complete will be based on the value of the partially completed work relative to the value of the item when entirely completed and ready for service.

2. A retention of five percent (5%) of the value of work completed will be withheld from progress payments. This retention amount will remain constant throughout the contract period and will not be payable until the expiration of thirty-five (35) days after the recordation of the Notice of Completion.

B. Work Not Listed in the Schedule of Work Items

1. The General Conditions and items in the General Requirements, and Specifications which are not listed in the schedule of work items of the bid form are, in general, applicable to more than one listed work item, and no separate work item is provided, therefore. Include the cost of work not listed but necessary to complete the project designated in the contract documents in the various listed work items of the bid form.

2. The bids for the work are intended to establish a total cost for the work in its entirety. Should the Contractor feel that the cost for the work has not been established by specific items in the bid form, include the cost for that work in some related bid item so that the proposal for the project reflects the total cost for completing the work in its entirety.

3. The Contractor is not expected to experience difficulty in excavation due to rock or unsuitable backfill material throughout the project locations. It shall be the Contractor's responsibility to identify any areas and account for difficulty in excavation, the need to export rock or unsuitable backfill material and the need to import suitable backfill material. There will not be additional contract time or additional compensation for any project locations where any of these circumstances occur.

C. Bid Items

1. Mobilization, Bid Item 1:

Payment for Mobilization shall be made at the contract lump sum price and shall constitute full compensation for all labor, material, equipment, and incidentals required within Section 01721. The bid price shall include, but not limited to, preliminary construction schedule, bonds, insurance, installation and relocation of information signs, shop drawings, catalog submittals and shall constitute full compensation for all labor,

material, equipment and incidentals required. The bid price for mobilization shall not exceed 5 percent of the Bid Schedule total price.

2. Site Demolition, Bid Item 2:

Item includes but is not limited to the removal and proper offsite disposal of existing improvements as specified on the project plans and specifications. Work includes demolition of existing pavement, utilities, and other site elements as required for construction.

Payment for this item shall be made based on the percentage of project completion to ensure compliance with all requirements throughout the duration of the contract. The completeness shall be determined by the Engineer and updated on progress payments.

3. Removal of all trash and debris, shrubs, bushes, and pavement, Bid Item 3:

Item includes but is not limited to removal of all: trash, debris, shrubs, bushes, pavement and pavement grindings from right of way. Dust control and export to allow for installation of proposed improvements per the plans. This item includes asphalt grindings spread throughout the parking surface and shall only be paid when removal of all items have occurred, and the site is ready for installation of proposed improvements.

Payment for this item shall be made based on the percentage of project completion to ensure compliance with all requirements throughout the duration of the contract. The completeness shall be determined by the Engineer and updated on progress payments.

4. Civil Site Work, Bid Item 4:

Item includes but is not limited to grading, trenching, excavation, backfilling, subgrade preparation, base course, aggregate surfaces, utilities, new electrical service, remove concrete vault, and associated site development elements as specified on the Phase 1 project plans and specifications.

Payment for this item shall be made based on the percentage of project completion to ensure compliance with all requirements throughout the duration of the contract. The completeness shall be determined by the Engineer and updated on progress payments.

5. Reroofing of Existing Building, Bid Item 5:

Item includes, but is not limited to, complete removal and replacement of roofing on the existing facility as specified on the Phase 1 project plans and specifications. Includes:

- Roof membrane and insulation
- Flashings and edge metals
- Re-flashing of Roof drains, downspouts and overflows
- Walk pads for access

Work shall provide a complete and watertight roofing system, coordinated with expansion areas.

Payment for this item shall be made based on the percentage of project completion to ensure compliance with all requirements throughout the duration of the contract. The completeness shall be determined by the Engineer and updated on progress payments.

6. Concrete Work, Bid Item 6:

Item includes but is not limited cast-in-place concrete foundations, curbs, equipment pads, walkways, curb and gutter repair, and other flatwork or structural concrete elements as specified on the Phase 1 project plans and specifications. Also includes, furnishing and installing floor expansion joints, including joint covers, and sealants. The floor expansion joint system shall provide a structurally independent connection between new and existing concrete construction.

Payment for this item shall be made based on the percentage of project completion to ensure compliance with all requirements throughout the duration of the contract. The completeness shall be determined by the Engineer and updated on progress payments.

7. Structural Work, Bid Item 7:

Item includes but is not limited to furnishing and erecting structural steel, miscellaneous metals, connections, anchorage, bracing, roof stairs and related structural components as specified on the Phase 1 project plans and specifications.

Payment for this item shall be made based on the percentage of project completion to ensure compliance with all requirements throughout the duration of the contract. The completeness shall be determined by the Engineer and updated on progress payments.

8. CMU Walls and Masonry Work, Bid Item 8:

Item includes, but is not limited to, construction of concrete masonry unit (CMU) walls, reinforcing, grout, bond beams, lintels, control joints, and associated masonry elements. Also includes, furnishing and installing expansion joints between the new and existing buildings, including joint covers, sealants, fire barriers, flashings and related structural components as specified on the Phase 1 project plans and specifications. The expansion joint system shall provide a watertight seal while allowing for structural independence between the existing and new construction.

Payment for this item shall be made based on the percentage of project completion to ensure compliance with all requirements throughout the duration of the contract. The completeness shall be determined by the Engineer and updated on progress payments.

9. Architectural Work, Bid Item 9:

Item includes but is not limited to architectural finishes, doors, door sealers, door hardware, windows, insulation, coatings, ceilings, partitions, roofing membrane and roof insulation for new addition including flashings and edge metals, roof drains, downspouts

and overflows, walk pads for access and other architectural features as specified on the Phase 1 project plans and specifications.

Payment for this item shall be made based on the percentage of project completion to ensure compliance with all requirements throughout the duration of the contract. The completeness shall be determined by the Engineer and updated on progress payments.

10. HVAC Work, Bid Item 10:

Item includes but is not limited to furnishing and installing all mechanical systems, ductwork, air handlers, exhaust fans, diffusers, louvers, controls, and supports and all associated components as specified on the Phase 1 project plans and specifications.

Payment for this item shall be made based on the percentage of project completion to ensure compliance with all requirements throughout the duration of the contract. The completeness shall be determined by the Engineer and updated on progress payments.

11. Plumbing Work, Bid Item 11:

Item includes but is not limited to furnishing and installing all domestic water, waste, vent, drainage, and other plumbing systems including piping, fixtures, supports, insulation, and all associated components as specified on the Phase 1 project plans and specifications.

Payment for this item shall be made based on the percentage of project completion to ensure compliance with all requirements throughout the duration of the contract. The completeness shall be determined by the Engineer and updated on progress payments.

12. Electrical Work, Bid Item 12:

Item includes but is not limited to furnishing and installing all electrical systems including lighting, power, grounding, conduits, wiring, panels, controls, switches, outlets, and all associated devices and components as specified on the Phase 1 project plans and specifications. Including work in the existing building electrical room.

Payment for this item shall be made based on the percentage of project completion to ensure compliance with all requirements throughout the duration of the contract. The completeness shall be determined by the Engineer and updated on progress payments.

13. Fire Protection Systems (Including Fire Alarm and Sprinklers), Bid Item 13:

Item includes, but is not limited to, furnishing and installing all fire protection systems, including wet-pipe sprinkler systems, fire alarm devices and panels, strobes, pull stations, fire department connections, and related appurtenances and components as specified on the Phase 1 project plans and specifications.

Work shall be coordinated with architectural, structural, and electrical systems and meet all applicable fire and life safety codes and authority having jurisdiction (AHJ) requirements.

Payment for this item shall be made based on the percentage of project completion to ensure compliance with all requirements throughout the duration of the contract. The completeness shall be determined by the Engineer and updated on progress payments.

14. Demobilization, Bid Item 14:

Payment for demobilization shall be made at the contract lump sum price and shall constitute full compensation for all labor, material, equipment and incidentals required.

15. Remaining Work Not Specifically Listed, Bid Item 15:

This item includes the cost of all labor, materials, equipment, and services required to complete portions of the Work not specifically identified under other bid items but necessary to complete the project per the Contract Documents.

Payment shall be made at the lump sum price for this item. This shall constitute full compensation for completing all work required that has not been specifically included in prior bid items.

16. Contingency: Unforeseen work not covered within all other bid items, Bid Item 16:

Payment for unforeseen work not covered within all other bid items shall be made at the contract lump sum price and shall constitute full compensation for all labor, material, equipment, and incidentals required. Unforeseen work must be approved by the City staff before doing any work and pay estimate shall be negotiated based on unit price already established with the bid proposal for this project. Any work required that is outside of the proposed bid unit cost, shall be performed based on time & material (T&M) basis and T&M cost shall be negotiated and approved by the City staff prior to performing the work. Unforeseen work will be paid in each billing cycle with a percentage of the lump sum cost included in the bid. This item may or may not be spent entirely.

END OF SECTION

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SECTION 01251 CHANGE ORDER REQUESTS

1.1 GENERAL

A. All quotations for preliminary change orders for extras, changes, additions, or deletions to the Work as described in EXTRA WORK of the GENERAL CONDITIONS shall be submitted to the ENGINEER, in writing, on the Change Order Request (COR) Cover Sheet and the Change Order Cost Summary Form, both attached, and in conformance with the requirements of Section 01254 CHANGE ORDERS. The quotation shall be firm for a period of not less than sixty (60) calendar days from the date of receipt of the quotation by the ENGINEER. The CONTRACTOR shall submit its written cost quotation and Time Impact Analysis not later than fifteen (15) days after being requested to provide such quotation, unless the ENGINEER allows more time. Delays in submitting quotations beyond the fifteen (15) days set forth herein, which cause a delay in the issuance of a Change Order or a delay to the completion date of the project, shall not be cause for a claim or a time extension under the Contract.

B. The ENGINEER'S request for quotation on a preliminary change shall not be considered authorization to proceed with the changed work prior to the issuance of a final Lump Sum or Time & Material Change Order, unless directed otherwise, in writing, by the ENGINEER, nor shall such request constitute justification for a delay to the existing Work or a time extension under the Contract.

END OF SECTION

THE CITY OF REDLANDS
MUNICIPAL UTILITIES AND ENGINEERING DEPARTMENT

CHANGE ORDER REQUEST (COR)

Project Name:		**COR Number:**	
Project Number:		**Date of Request:**	
Requested By:			

Change Name:	

Description of Change (Required):

Reason for Change (Required):

Location of Change (Required): List all locations if various locations are included in this Request

Additional Days Requested Due to Change (If Applicable):

Total Net Change in Cost: **Note:** Attach all supporting documents for cost justification	$ 0.00

Requestor:

Signature: _____

Title: _____ **Date:** _____

Change Order Cost Summary

Project Name :

Change Order Request No. :

Date :

		Direct Labor	Direct Materials	Direct Equipment		Totals
(1):	Lump Sum Work by Prime Contractor	$0.00	$0.00	$0.00		
(2):	"T&M" Work by Prime Contractor	$0.00	$0.00	$0.00		
(3):	Subtotal - Direct Work (Prime Contractor)	$0.00	$0.00	$0.00		
(4):	All Lump Sum Work by subcontractors (any tier)	$0.00	$0.00	$0.00		
(5):	All "T&M" Work by subcontractors (any tier)	$0.00	$0.00	$0.00		
(6):	Subtotal - Direct Work (all subcontractors)	$0.00	$0.00	$0.00		$0.00
					Add each of the three columns across and enter to the right.	
(3)+(6)=(7):	Total - Direct Costs	$0.00	$0.00	$0.00		$0.00
(8):	Markup	(20% of direct labor) $0.00	(15% of direct mat'l) $0.00	(15% of direct equip) $0.00		$0.00
(9):	Prime Contractor Markup for subcontractors				10% of line (6) direct sub work up to $5,000 plus 5% of line (6) direct sub work over $5,000	
(10):	Bonds & Insurance				1% of line (7) all direct work	$0.00
(11):	Additional amount permitted by Contract					
(12):	**GRAND TOTAL**				Add sums of lines) (7), (8), (9), (10) and (11)	**$0.00**

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SECTION 01254 CHANGE ORDERS

PART 1 - GENERAL

1.1 REQUIREMENTS

Payment to the Contractor, or credit to the City, for any change, addition, deletion or extra to the Work, or settlement of any Claim, covered by any Change Order, shall be determined by the methods set forth herein. The Engineer may change the Plans and Specifications, character of the Work, or quantity of Work provided the total arithmetic dollar value of all such changes, both additive and deductive, does not exceed twenty-five percent (25%) of the Contract Price. Should it become necessary to exceed this limitation, the change shall be by written Supplemental Agreement between the Contractor and the City, which shall be executed by a Change Order.

Unless otherwise stipulated, "Unit Prices" include all costs necessary to furnish, install and complete the Work. The "Unit Prices" include all direct costs for labor, equipment and materials, all insurance and bond costs, all field and office supervisors and assistants, all onsite project administration, security costs, the cost of small tools and consumables, incidental job burdens, and all general home office expenses and no separate allowance will be made therefor. Assistants to field and office supervisors include all clerical, stenographic, and general office help. Incidental job burdens include, but is not limited to, office equipment and supplies, temporary toilets, telephone, utilities, safety equipment, warning devices, personal protective equipment, and conformance to OSHA requirements. Project administration includes, but is not limited to, review and coordination, estimating, engineering, scheduling, and expediting relative to Change Orders, and updating and furnishing Record Drawings to incorporate changes, schedule update, supervision not applied solely to the Work of the Change Order, home office salaries and expenses, and City of Redlands Business Tax.

A. Unit Prices

Unit prices stipulated in the Bid or itemized in the approved Schedule of Values shall be utilized, where they are applicable and determined reasonable by the Engineer. In the event that the Change Order results in a change in the original quantity of more than twenty-five percent (25%), either increase or decrease, then either the Engineer or the Contractor may request a review of the unit price to determine if a new unit price shall be mutually determined by negotiation. Any new unit price mutually determined under this Subsection shall only apply to the units in excess of one hundred twenty five percent (125%) of the original quantity for overruns. In case of underruns, the unit price stipulated in the Bid shall be applied to the first twenty-five percent (25%) of the actual quantity of work performed and the new mutually determined price shall be applied to the quantity between twenty-five percent (25%) and seventy-five percent (75%) of the original quantity.

Renegotiated unit prices or unit prices for new items added to the Contract by Change Order shall be determined in accordance with Subsections B through G. Whether stipulated in the Bid, itemized in the approved Schedule of Values or renegotiated, the unit prices used for payment constitute the total adjustment with no further costs owed for overhead, impact, profit, delay or impact to unchanged portions of the Contract, or any other reason. The unit price shall be full and final compensation as described in Subsection D.

The cost proposals for renegotiated unit prices shall be presented in accordance with the provisions of Subsections B through G. Should any Bid Item be deleted in its entirety, the amount bid for that bid item shall be subtracted from the total Contract amount. The Contractor shall be paid only for the actual cost incurred prior to the notification of such deletion for that Bid Item.

B. Lump Sum

The Engineer and the Contractor may mutually determine a total sum for the Extra Work. The Contractor shall summarize the total cost and furnish a breakdown of the proposed lump sum costs satisfactory to the Engineer in accordance with Subsections B through G. Such lump sum costs shall be full and final compensation as described in Subsection D. The Contractor's quotation shall conform to the requirements of Section 01251- Change Order Requests, and be submitted in the Change Order Cost Summary Form provided (see Attachment 01251-A1). The Change Order Cost Summary Form cannot be used to nullify or supercede any specification or contractual provision.

If the method or amount of payment cannot be agreed prior to performing the Extra Work, the Engineer may unilaterally issue a Change Order in the amount determined reasonable by the Engineer for the Extra Work and direct the Contractor to proceed immediately. The Engineer also has the option to issue a Change Order directing the Work be done on a Time and Materials basis with the Contractor providing all labor, equipment, and materials necessary to complete the Work in a satisfactory manner and within a reasonable period of time. Estimates for lump sum quotations and accounting for Time and Materials work shall be limited to direct expenditures necessitated specifically by the subject Extra Work, and shall be segregated as follows:

1. Labor, up to and including working general foremen, who are directly assigned to the Extra Work. Employees identified as superintendents or non-working general foremen shall not be charged as labor on Extra Work. The labor costs shall include actual documented payroll costs including wages, payroll taxes as established by law (i.e., FICA, Federal and State Unemployment Taxes), fringe benefits as established by negotiated labor agreements, and any insurance costs (such as Worker's Compensation and General Liability Insurance but shall not include Automobile Liability Insurance or any other insurance costs). A detailed breakdown of those

subcomponents of labor costs, by all crafts shall be submitted to the Engineer, by the Contractor and all Subcontractors, for approval, as part of the documentation of labor costs, within ten (10) working days after issuance of the Notice to Proceed. No other subcomponents of labor costs shall be considered, unless approved in writing by the Engineer.

The labor cost is not allowed to be increased by using labor classifications with paygrades higher than necessary to accomplish the Work.

2. Materials: The cost of materials used in performing the Extra Work will be the cost, including sales tax and freight, to the purchaser, whether Contractor, Subcontractor or other forces, from the supplier thereof, except as follows:

   a. Cash or trade discounts available to the purchaser shall be credited to the City notwithstanding the fact that such discounts may not have been taken by the Contractor.

   b. For materials secured by other than a direct purchase and direct billing to the purchaser, the cost shall be deemed to be the price paid to the actual supplier as determined by the Engineer. Supplier markup, except for actual costs incurred in the handling of such materials, will not be allowed.

   c. Payment for materials from sources owned wholly or in part by the purchaser shall not exceed the price paid by the purchaser for similar materials from said sources on contract items or the current wholesale price for such materials delivered to the Jobsite, whichever price is lower.

   d. If, in the opinion of the Engineer, the cost of materials is excessive, or the Contractor does not furnish satisfactory evidence of the cost of such materials, then the cost shall be deemed to be the lowest current wholesale price for the quantity concerned, delivered to the Jobsite less cash or trade discount. The City reserves the right to furnish materials for the Work and no claim shall be made by the Contractor for costs and profit on such materials.

   e. For the purposes of this Section, a "Supplier" is defined as any person or persons, firm or business, who supplies materials of construction and/or permanent equipment, but who does not perform any portion of the Work of the Contract on site, for the Contractor, except that labor or labor supervision which may be required by some manufacturers as part of their equipment installation for warranty or other purposes.

3. Equipment Costs, including ownership, lease or rental costs, as well as operating costs, for individual equipment units whose replacement value is in excess of $500. Transportation and set up costs shall be included, but only if the equipment is imported to the worksite solely to perform work on the Extra Work described in the Change Order and the Contractor can demonstrate that the changed work cannot or could not be performed economically with equipment already at the site. Equipment costs shall be determined in accordance with the requirements set forth in Subsection G.

4. Small tools, equipment, consumables and incidental costs: No separate payment will be made for the use of small tools or equipment with a replacement value of $500 or less. This applies to tools and equipment owned by the Contractor or its subcontractors of any tier. Also, no separate payment will be made for fuel, lubricants, tool or equipment repairs, tool or equipment maintenance, consumables, drinking water, sanitary facilities or other incidentals. These costs are already included as a part of Markup.

5. Subcontractor Costs, including their overhead and profit, provided that such costs are direct costs to the Contractor for performing the Extra Work as set forth in Subsections B through G.

C. Time and Materials Work

The costs of all Changed/Extra Work submitted under the Time and Materials (T&M) method shall be formulated in accordance with the provisions of Subsections B through I.

Unless otherwise stipulated on the Change Order, the “Not-to-Exceed” amount for all T&M Change Orders is $10000. The Contractor is responsible for tracking costs and for notifying the Engineer in writing when costs approach 50% and 75% of the “Not-to-Exceed” amount. In addition, if the Changed/Extra Work cannot be completed within the “Not-to-Exceed” limit, the Contractor shall notify the Engineer in writing, and in a timely manner, that the limit requires an increase. The City will only reimburse eligible costs up to the “Not-to-Exceed” amount.

The Contractor shall notify the Inspector at the beginning of each day when Changed/Extra Work is being performed. The Contractor shall notify the Inspector of the Changed/Extra Work being performed and describe the personnel involved, whether by Contractor forces or by its subcontractors at any tier. Failure to notify the Inspector prior to the start of Changed/Extra Work serves as the Contractor’s waiver to claim for compensation on that day.

For each working day, the Contractor shall submit a “Daily Extra Work Report” (DEWR) to the Inspector. The “Daily Extra Work Report” shall summarize labor,

equipment and materials supplied. The Inspector will only consider Forms that are properly completed as described below.

1. Separate forms must be used for labor and for equipment/materials.

2. Labor, equipment, material or expenditures that are not included on The DEWR are ineligible for payment. There will be no exceptions to this requirement. It is the responsibility of the Contractor to include any and all items of labor, equipment, or material for which it requests compensation for each day's work completed.

3. Information required on the Labor form shall include name of personnel, personnel classification, and only the number of hours worked on Changed/Extra work for the day being reported. Since the overhead allowance already includes all necessary supervision, any hours for additional supervision or non-working foremen are ineligible for additional payment. The premium pay for a general foreman is eligible for payment only if the general foreman is a working foreman and a general foreman was required by a Union Labor Agreement or otherwise approved by the Inspector. The general foreman rate is eligible for payment only during the time that a general foreman was required for the Changed/Extra Work.

4. Information required on the Equipment/Material shall include Contractor-owned equipment and/or tools, and rented equipment or tools for which compensation is requested. Information shall include the type of equipment, size of equipment, equipment identification number, appurtenances, and only the number of hours worked on the Changed/Extra work.

5. The only allowable materials are materials delivered to the job site and/or incorporated only into the Changed/Extra work. The allowable materials shall be listed on the T&M sheet for the day that they are delivered to the job site and/or incorporated into the Changed/Extra work.

6. Delivery ticket(s) and/or bill(s) of lading for rental equipment and/or tools delivered to the site and/or material incorporated into the work for the day being reported must be attached with the T&M sheet for that day. No payment will be allowed for materials and/or rented equipment unless receipt(s) or bill(s) of lading is attached. If the request for payment is not substantiated by original vendor/supplier invoices, acceptable copies of original invoices, or other documentation acceptable to the Inspector, the City may establish the cost of the item(s) at the lowest possible wholesale price or rental rate applicable while the work was being performed.

7. Failure to submit the required "Daily Extra Work Report of Time and Material Work" by the close of the next working day shall waive all rights for that day unless otherwise approved by the Inspector. Work that cannot be substantiated by a "Daily Report", approved and signed by the Inspector, is ineligible for payment.

8. The Contractor is responsible for preparing the "Daily Extra Work Report" for work by its Subcontractors and submitting the Forms to the Inspector on time.

9. The Contractor must have each "Daily Extra Work Report" verified by the Inspector. After the "Daily Extra Work Report" is approved by the Inspector, both the Contractor and Inspector sign the report. The original "Daily Extra Work Report" is retained by the Inspector with a copy provided to the Contractor.

10. When the "Daily Extra Work Report" is signed by the Inspector and the Contractor, it is binding on the Contractor and its Subcontractors.

11. When agreed to by the Inspector, the Contractor may submit a supplemental "Daily Extra Work Report" for labor, materials, or equipment for which the Contractor requests compensation but failed to list on the original daily report.

    a. These supplemental forms shall be marked "SUPPLEMENTAL".

    b. Unless otherwise approved by the Inspector, the supplemental forms may only be submitted for approval up to two (2) working days following the date when the work was performed.

No payment will be allowed for labor, materials, or equipment included on T&M sheets not signed by the Contractor and the Inspector. Payment will not be allowed for labor, materials, or equipment included on T&M sheets signed by anyone other than the Inspector or the Inspector's immediate supervisor.

D. General

It is the intent of the City to settle all Change Orders full and final at the time the Change Order is issued. Therefore, the following paragraph shall be made a part of all Change Orders, whether included or not on the actual change order:

> "The compensation (time and cost) set forth in a Change Order comprises the total compensation due the Contractor, all Subcontractors, and all Suppliers, for the Work or change defined in the Change Order, including impact on unchanged work. By signing the Change Order, the Contractor acknowledges and agrees on behalf of himself, all Subcontractors, and all

Suppliers, that the stipulated compensation includes payment for all work contained in the Change Order, plus all payment for the interruption of schedules, extended field overhead costs, delay, and all impact, ripple effect or cumulative impact on all other work under this Contract. The signing of the Change Order indicates that the Change Order constitutes full mutual accord and satisfaction for the change, and that the time and/or cost under the Change Order constitutes the total equitable adjustment owed the Contractor, all Subcontractors, and all Suppliers as a result of the change. The Contractor, on behalf of himself, all subcontractors, and all Suppliers, agrees to waive all rights, without exception or reservation of any kind whatsoever, to file any further claim related to this Change Order. No further claim or request for equitable adjustment of any type for any reasonably foreseeable cause shall arise out of or as a result of this Change Order or the impact of this Change Order on the remainder of the Work under this Contract."

Costs which shall not be paid in Change Orders under this Contract include, but are not limited to, interest costs of any type; claim preparation or filing costs; legal expenses; the costs of preparing or reviewing proposed Change Orders or Change Order proposals; lost revenue; lost profits; lost income or earnings; rescheduling costs; costs of idled equipment when such equipment is not at the site or has not yet been employed on the Work; lost earnings or interest on unpaid retainage; claims consulting costs; and the costs of corporate officer or staff visiting the site; any compensation due to the fluctuation of foreign currency conversion or exchange rates; loss of other business; changes in taxes or increased tax rates of any kind or any costs identified as unallowable under the provisions of the Federal Acquisition Regulations.

Extensions of time shall be based solely upon the effect of delays to the Work as a whole. Extensions of time shall not be granted for delays to the Work, unless the Contractor can clearly demonstrate, through analysis of the current updated schedule, that the delay to the Work as a whole arose or will arise from causes other than normal weather, beyond the control and without fault or negligence of the Contractor, or any Subcontractor, at any tier, and that such delays did or will, in fact, delay the progress of the Work as a whole. The Contractor shall not be entitled to a time extension unless it submits a Time Impact Analysis which is a calculation of the extent of the delay to the end date of the Work and which shows that the Work has been or will be extended beyond the current Contract completion date. A Time Impact Analysis is a scheduling procedure which utilizes the networking techniques (fragnets) and a written analysis of the facts associated with the alleged delay to demonstrate the effect of the alleged delay on the critical path of the schedule. A "fragnet" is defined as a sequence of new activities and/or activity revisions that are proposed to be added to the existing current updated schedule to demonstrate (mathematically and graphically) the influence of the alleged delay on the end date of the Work and shall be the sole method for incorporating delays and impacts into the schedule. The objective of a

Time Impact Analysis is to pinpoint, isolate, and quantify all time impact associated with a specific issue and determine its time relationship to past or current delays. Time extensions shall not be allowed for delays to parts of the Work that are not on the critical path of the currently approved monthly updated project schedule. Time extensions shall not be granted, nor delay damages of any kind whatsoever paid to the Contractor, until all available float, slack, or contingency time on the project is used and the end date of the Work is moved beyond the current, adjusted Contract completion date.

The cost summary, cost breakdowns and requests for cost reimbursement submitted by the Contractor (for delay, disruption, hindrance and interference associated with the changes, additions, deletions or extras) shall be itemized in a manner that, with mathematical certainty and without reliance upon probabilities or inferences, segregates the direct, actual reimbursable costs associated with each individual, change, addition, deletion, extra and (on an event-by-event basis) each individual delay or disruption event. Such cost summaries, breakdowns or requests shall not be based, in whole or in part, upon any methodology (such as "total cost" or "modified total cost" methodologies) that purports to calculate the Contractor's additional costs of performance of the extra, change, addition or deletion (including without limitation the additional costs of delay, disruption or other impact) based on the difference between Contractor's total actual Project or line item costs (with or without fee) and its original bid estimate for the Project or any original bid estimate line item. In connection with the foregoing, Contractor represents and warrants that it has the ability to generate and maintain complete and accurate cost accounting records that will reflect (i) the actual costs incurred or saved for each individual item of Extra Work, change, addition, deletion (including without limitation any costs of associated delay, disruption, interference, hindrance and the cumulative impact of each extra, change, addition, deletion on other parts of the Work); and, (ii) on an event-by-event basis, the effect of each delay or disruption that forms the basis of each request for extension of time, regardless of their scope, number, complexity, cumulative effect, or time of issuance or occurrence.

Except as provided in Section 6-6 of the General Conditions, Contractor shall have no right to recovery of any compensation, costs, expenses or damages resulting from delay, disruption, interference, or hindrance in the performance of the Work (including without limitation interruption of schedules, excess or extraordinary extended field and indirect overhead costs, loss of productivity and the impact, ripple or cumulative effect on other Work).

Contractor waives any claim or rights and remedies based on abandonment, quantum merit, rescission or other similar legal theory by reason of any of the following circumstances, which the Contractor acknowledges and agrees are within the reasonable contemplation of the parties: (i) changes, additions, deletions and extras to the Work after execution of the Contract and issued from time to time throughout the period of construction, regardless of their scope,

number, cumulative value, or complexity, to correct errors, omissions, conflicts, and ambiguities in the Contract Documents, or to implement discretionary changes to the scope of Work requested by the City; (ii) the issuance and performance of changes, additions, deletions and extras in a manner that is not in sequence with the as-built or as-planned progress of the Work; (iii) changes due to Differing Site Conditions; (iv) suspensions of the Work or parts thereof, or limitations on access to portions or all of the Work, for the convenience of City or in the interests of the Project; (v) delay or disruption to the Work due to failure of the City, Engineer or Inspector to timely perform any contractual obligation.

E. Markups – Overhead and Profit

1. In addition to the direct expenditures specified for labor, materials and equipment in Subsection B, a lump sum will be paid for all overhead and profit, including: All insurance costs other than specifically mentioned in this Section, all field and office supervisors and assistants, all onsite project administration, security costs, the cost of small tools and consumables, incidental job burdens, and all general home office expenses and no separate allowance will be made therefor. Assistants to field and office supervisors include all clerical, stenographic, and general office help. Incidental job burdens include, but is not limited to, office equipment and supplies, temporary toilets, telephone, utilities, safety equipment, warning devices, personal protective equipment, and conformance to OSHA requirements. Project administration includes, but are not limited to, review and coordination, estimating, engineering, scheduling, and expediting relative to Change Orders, and updating and furnishing Record Drawings to incorporate changes, schedule update, supervision not applied solely to the Work of the Change Order, home office salaries and expenses, and City of Redlands Business Tax. Such lump sum shall conform to the following schedule of percentages of the total amount of direct expenditures of the Contractor and subcontractors.

(a) Work by Contractor. The following percentages shall be added to the Contractor's costs and shall constitute the markup for all overhead and profits:

1) Direct Labor	20%
2) Direct Materials	15%
3) Direct Equipment	15%

(b) Work by Subcontractor. When all or any part of the extra work is performed by a Subcontractor, the markup established in (a) shall be applied to the Subcontractor's actual cost of such work. A markup of 10 percent on the first $5,000 of the subcontracted portion of the extra work and a markup of 5 percent on work added in excess of $5,000 of the subcontracted portion of the extra work may be added by the Contractor.

2. Bonds and Insurance

An additional allowance of one percent (1%) of all direct costs (less markup) is allowed.

3. Add/ Deduct Changes

The overhead rates determined above shall be applied to all additive Change Orders, except those utilizing as-bid Unit Prices listed in the Bid Proposal.

Any change in the Work involving both extras and credits shall show a net total cost, including subcontracts. Allowances for overhead and profit to the net total cost, as specified herein above, shall be applied if the net total cost is an extra; overhead and profit allowances shall not be applied if the net total cost is a credit. The estimated cost of deductions shall be based on labor and material prices on the date the Contract was signed.

4. When all or any part of the extra work is performed by a Subcontractor, the markup established in subsection 1.1.E.1 shall be applied to the Subcontractor's actual cost of such work. A markup of 10 percent on the first $5,000 of the subcontracted portion of the extra work and a markup of 5 percent on work added in excess of $5,000 of the subcontracted portion of the extra work may be added by the Contractor.

F. City Furnished Materials, Equipment and Services

The Engineer reserves the right to furnish materials, equipment and services deemed expedient for use on the Changed/Extra Work. The Contractor shall have no claim for profit or overhead on the cost of such materials, equipment and services.

G. Equipment Costs

The rates for rental or leased equipment shall not exceed the rates listed in the Caltrans Labor Surcharge and Equipment Rental Rates (Caltrans LS&ERR). For T&M Change Orders, the rates are established by the actual paid invoice(s) that comply with the requirements of Subsections G.1 and G.3. Owned equipment costs shall not exceed the rates established by Subsection G.2. The most recent published edition in effect at the commencement of actual equipment use shall be used.

The rates paid for any rented or leased equipment or tools shall include the cost of fuel, oil, lubrication, supplies, small tools, necessary attachments, repairs and maintenance of any kind, depreciation, storage, insurance and all incidental costs associated with the operation of the equipment or tools.

It is the responsibility of the Contractor to include any appurtenances added to equipment which would increase the basic rate for said equipment (i.e., hoe-ram, oversize bucket, and etcetera) as established in the acceptable rental rate guide. All equipment and/ or tools shall be acceptable to the Inspector, in good working condition, suitable for the purpose for which it is to be used, and necessary to complete the Changed/Extra Work. Payment will be based on the manner in which the equipment was actually powered, operated and modified per the equipment manufacturer's recommendations.

1. Rented or Leased Equipment

For equipment rented or leased (including lease with purchase option) in arm's length transactions from outside vendors, the Contractor shall be paid the actual invoiced, rented or leased rates provided that the invoiced lease or rental rates do not exceed the rates set forth in the Caltrans LS&ERR. Arm's length rental or lease transactions are those in which the firm involved in rental or lease of such equipment is not associated with, owned by, have common management, directorship, facilities, or stockholders with the firm renting the equipment. Submittal by a Contractor of a rental or leased invoice from the lessor will be prima facie proof of compliance with the above. However, such invoices are not conclusive proof; if questioned, the burden of proof remains with the Contractor. In no event shall the leased equipment rate billed to the City be at rates exceeding those prescribed in the following table:

Actual Usage (Change Order & Contract Work Combined)	Payment Category
Less than 8 hours	Hourly Rate
8 or more hours but less than 7 days	Daily Rate
7 or more days but less than 30 days	Weekly Rate
30 calendar days or more	Monthly Rate

a. When in Use:

Actual equipment use time documented by the Inspector shall be the basis that the equipment was utilized on the changed work and paid for under the Change Order. In addition to the lease or rental rate, equipment-operating costs shall not exceed the estimated hourly operating rate as set forth in the Caltrans LS&ERR. The hours of operation shall be based upon actual equipment usage on the changed work as recorded by the Inspector. For multiple shift work sequences, the allowable equipment rate shall not exceed fifty percent (50%) of the base rate, for second or third shifts.

b. When Idle:

Idle equipment is equipment on site and necessary to perform the Work under the change but not in actual use due solely to the impact of the changed work. Equipment operating costs due to idle time, documented by the Inspector, shall be paid at the rate determined in "G" (1) above. Idle time shall include a reasonable time allowance to and from the project site.

Payment for equipment or tools shall be limited to hours actually worked on the Changed/Extra Work if the equipment or tool is already on site for Work under the original Contract. No "standby" time will be paid for equipment already on site for Work under the original Contract.

If equipment or tools are used intermittently and, when not in use, could be returned to the rental source at less expense than holding it at the work site, it shall be returned, unless the Contractor elects to keep it at the work site at no expense to the City.

2. Owned and Other Equipment

Equipment rates for owned equipment or equipment provided in other than arm's length transactions shall not exceed the total hourly costs as set forth in the Caltrans "Labor Surcharge and Equipment Rental Rates" effective at the time the work is performed. (The Caltrans equipment rental rates are available on the internet at http://www.dot.ca.gov/hq/construc/equipmnt.html.) If the equipment is not listed in Caltrans LS&ERR, then the Rental Rate Blue Book shall be used. When using the Blue Book, the hourly rate for any period less than 7 days shall be the weekly rate divided by 40, plus the Operating Cost. Except as noted herein below, this equipment hourly rate plus the estimated operating cost per hour from the Blue Book will be paid for each hour the equipment actually performs the Extra Work. Daily records listing the equipment units and their respective operators, identification code, and actual usage on the Work under the Change Order, as certified at the end of each workday (or work shift if the Work is being performed in multiple work shift sequence) by the Inspector shall be the record upon which actual equipment use shall be based. For multiple shift work sequences, the Caltrans overtime factor shall be applied (When using the Blue Book one-half the Non-Operating Cost will be deducted for second and third shifts. The Non-Operating Costs are the Blue Book monthly or weekly/40 rates, as applicable.). It is agreed that this rate shall represent payment in full for all the Contractor's direct costs.

a. When Idle:

Payment for equipment necessary to be on the site to complete the Work, but not in actual use due solely to the impact of the changed work, shall be paid per the table in Caltrans Standard Specifications Section 9-1.03A(3b), provided that its presence and necessity on the site has been documented by the Inspector, and further provided that the equipment was idled solely by actions of the City. Idle equipment time will only be paid as a function of delays specifically directed or caused by the City's actions. In no event shall the idle time claimed in a day for a particular piece of equipment exceed the normal work schedule established for the project - usually eight (8) hours per day or forty (40) hours per week, and excluding Saturdays, Sundays, and holidays. For multiple shift work sequence, the allowable idle equipment rate shall not be allowed, for second or third shifts. It is agreed that this rate shall represent payment in full for all the Contractor's direct costs.

3. Equipment Haulage and Set Up Costs

Documented and actual equipment haulage and set up costs shall be paid for, if applicable as set forth in Subsection B.3.

4. Other Equipment Cost Guides

In the event that a piece of equipment used on a Change Order is not listed in Caltrans or the Blue Book, costs may be derived from the Associated General Contractor's of America Equipment Ownership Guide, the Associated Equipment Dealers Guide, or the Equipment Rate Guide published by the U.S. Army Corps of Engineers as adjusted appropriately for the type of work and use and the regional area of the Work under this Contract.

H. Records

At any time should the Contractor deviate substantially from the schedule, method and sequence of operation, equipment, cost or pricing data furnished by the Contractor and agreed to by the City in connection with the Change Order or should the City determine that any price negotiated in connection with the Change Order is defective due to such deviation or the fault of the Contractor, the City reserves the right to reduce the Change Order cost and reissue the Change Order at the amount in which the City determines to be the actual costs to complete the change.

Whenever any material or process is indicated or specified by patent or a proprietary name, or by name of a manufacturer in the Change Order, such direction shall not relieve the Contractor's responsibility or obligation to perform work in accordance with the contract requirements. The Contractor shall be solely responsible for, and have control over construction means, methods, techniques, sequences and procedures, coordination of all portions of the contract and Change Order work.

The Contractor shall on a weekly basis submit an approximate accounting of the amount expended on the Time and Materials work to date and an estimate of the Impact to the time of performance of work.

I. Partial Payments for Time and Materials Work.

Progress payments for Time and Materials work shall only be made if the anticipated cost of the changed work is in excess of $50,000 and/or the time to perform the changed work will exceed two (2) months duration. To receive payments for Time and Materials work, the Contractor shall submit to the Engineer an invoice of the daily reports which were verified by the Inspector, with details and documents, verifying the Contractor's and Subcontractor's actual costs incurred for the Time and Materials work as set forth in Subsections B through H. Costs shall be submitted within thirty (30) calendar days after the T&M work has been satisfactorily completed unless an extension of time for submittal is authorized in writing by the Inspector.

END OF SECTION

SECTION 01298 SCHEDULE OF VALUES

1.1 GENERAL

A. The Schedule of Values shall be used as a basis for determining progress payments on a lump sum contract or any designated lump sum bid item. The Schedule of Values shall be a schedule of cost loaded construction activities equal, in total, to the lump sum bid and shall be in such form and sufficient detail to correctly represent a reasonable apportionment of the lump sum. Prior to submitting an invoice for payment, the CONTRACTOR shall have submitted a detailed Schedule of Values and obtained approval from the ENGINEER.

B. Each lump sum bid item on the Schedule of Work and Prices, as set forth in the Bid must be broken down separately. The breakdown of each lump sum bid item must cover the cost of construction required by the contract documents for that item. The sum of the values for the construction activities, within a bid item, must equal the total bid amount for that item. The breakdown shall include subcontract amounts which shall not deviate from the amounts submitted in the Bid Proposal. The CONTRACTOR shall provide certification from the Subcontractors certifying the subcontract amounts.

C. Each activity in the Schedule of Values shall delineate one construction activity. For example, the placement of concrete between construction joints, the construction of an electrical duct bank or pipeline between points A & B. The costing for each activity should include all costs for the labor and materials or equipment required to complete the activity. For example, concrete construction activities should include all costs for the forming, placing of reinforcement, placing concrete and curing. The cost for pipeline construction activities should include materials, equipment and installation including pipeline supports or thrust blocks. The excavation and backfill for a pipeline or structure may be separate activities. The Contract Price breakdown shall include the itemized costs for the plant establishment and any maintenance services to be performed before the final project acceptance is made. No non-construction activity shall be cost loaded.

D. The CONTRACTOR shall use cost loaded construction activities from the Construction Schedule as a Schedule of Values. Each construction activity shall be encoded to its bid item and a sort provided for each bid item totaling the cost loaded amount. The total of the Cost Loaded amounts for each bid item shall equal the amount bid for that item. The total of the Schedule of Values shall equal the current Contract value at all times. At any time during the progress of the Work of the Contract the INSPECTOR reserves the right to review the cost loading of the Schedules of Values and direct necessary revisions. When requested by the INSPECTOR, the CONTRACTOR shall provide all information necessary to substantiate the cost loading.

E. Attached are samples of the Schedule of Values. The City will provide project specific Schedule of Values for the CONTRACTOR to use throughout the project at the Preconstruction Meeting. The Schedule of Values must be used by the CONTRACTOR at the time of each progress payment.

END OF SECTION

Project Name

Contractor Name
Address
Address
Phone:

PROJECT NUMBER:

FOR BILLING PERIOD ENDING:
INVOICE DATE:
INVOICE NO.

	BID ITEM/DESCRIPTION OF WORK FOR BID ITEM	QUANT.	UNIT	UNIT BID PRICE	ITEM BID PRICE	WORK PREVIOUSLY COMPLETED		WORK COMPLETED THIS MONTH		TOTAL QTY TO DATE	VALUE OF WORK COMPL TO DATE
						QTY	$ VALUE	QTY	$VALUE		
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00

Project Name

Contractor Name
Address
Address
Phone:

PROJECT NUMBER:

FOR BILLING PERIOD ENDING:
INVOICE DATE:
INVOICE NO.

	BID ITEM/DESCRIPTION OF WORK FOR BID ITEM	QUANT.	UNIT	UNIT BID PRICE	ITEM BID PRICE	WORK PREVIOUSLY COMPLETED		WORK COMPLETED THIS MONTH		TOTAL QTY TO DATE	VALUE OF WORK COMPL TO DATE
						QTY	$ VALUE	QTY	$VALUE		
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00			0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00		$0.00	0.0	$0.00
					$0.00		$0.00			0.0	$0.00
	TOTALS				$0.00		$0.00		$0.00		$0.00

SUMMARY OF CHANGE ORDERS	QTY	UNIT	UNIT BID PRICE	QTY	$ VALUE	QTY	$ VALUE	TOTAL QTY TO DATE	VALUE OF WORK COMPL TO DATE
CHANGE ORDER NO. 1	1	LS						0.0	$0.00
CHANGE ORDER NO. 2	1	LS						0.0	$0.00
CHANGE ORDER NO. 3	1	LS						0.0	$0.00
CHANGE ORDER NO. 4	1	LS						0.0	$0.00
CHANGE ORDER NO. 5	1	LS						0.0	$0.00
CHANGE ORDER NO. 6	1	LS						0.0	$0.00
CHANGE ORDER NO. 7	1	LS						0.0	$0.00
CHANGE ORDER NO. 8	1	LS						0.0	$0.00
CHANGE ORDER NO. 9	1	LS						0.0	$0.00
CHANGE ORDER NO. 10	1	LS						0.0	$0.00
								0.0	$0.00
								0.0	$0.00
								0.0	$0.00
								0.0	$0.00
								0.0	$0.00
CHANGE ORDERS TOTAL			$0.00				$0.00		$0.00

			VALUE OF WORK COMPLETED TO DATE	$0.00
ORIGINAL CONTRACT PRICE	$0.00		AMOUNT DUE THIS PERIOD INCL RETENTION	$0.00
TOTAL AMOUNT OF CHANGE ORDERS	$0.00		LESS 5% RETENTION	$0.00
ESTIMATED TOTAL CONTRACT PRICE TO DATE	$0.00		**AMOUNT DUE THIS PERIOD**	**$0.00**

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SECTION 01321 CONSTRUCTION SCHEDULE

1. THE REQUIREMENT

A. It is expressly understood and agreed that the time of beginning, the rate of progress, and the time of completion of the Work are of the essence of this Contract.

B. The CONTRACTOR’S representative in charge of scheduling is required to attend all meetings pertaining to scheduling and progress of the Work.

C. The CONTRACTOR shall submit to the ENGINEER 3 hard copies and the electronic file of the CONTRACTOR'S Construction Schedule (the schedule) at the time of the preconstruction meeting. The schedule shall be either a Critical Path Method (CPM) Network or a detailed Bar Chart with the critical path clearly shown. If the CPM network option is used, then Primavera Project Management or Microsoft Project shall be the scheduling software. If a detail Bar Chart is used, Microsoft Excel shall be the software utilized. The schedule shall include the following:

1. Activity ID.
2. Activity description.
3. Start date for each activity.
4. Finish date for each activity.
5. Original duration.
6. Predecessor.
7. Successor.
8. Percent complete.
9. Remaining Ddys.

A minimum of seven (7) calendar days for review of each schedule. Schedule activities shall be of sufficient detail to assure adequate planning has been done for proper execution of the Work and such that, in the sole judgement of the ENGINEER, it provides an appropriate basis for monitoring progress. The schedule shall begin with the date of issuance of the Notice to Proceed and conclude with the date of Final Completion shown in the Contract. Submittal and approval of the schedule in accordance with the requirements of this Section is a condition precedent to the issuance of any payments under this Contract. Once the schedule is approved it will become the baseline schedule and must be shown and compared on all subsequent schedule submittals.

D. Float, slack time, or contingency within the schedule (i.e., the difference in time between the project's early completion date and the required Contract Completion date), and total float within the schedule, is not for the exclusive use of either the CITY or the CONTRACTOR but is a jointly owned expiring resource available to and shared by both parties. Pursuant to this float sharing requirement, use of float

suppression techniques shall be cause for rejection of the schedule and any revisions or updates.

E. Time extensions shall not be granted nor delay damages paid until a delay occurs which is beyond the control and without the fault or negligence of the CONTRACTOR and its Subcontractors or Suppliers, at any tier, and which extends actual performance of the Work beyond the current Contract completion date and the completion date projected by the current, approved, updated schedule. If the delay occurs along a path, which the current approved Construction Schedule update projects late completion prior to addition of any CITY caused delay, then the time extension allowed will be only for the additional delay demonstrated by the approved Time Impact Analysis. Time extensions shall be granted only if they are clearly demonstrated by the CONTRACTOR through the submittal, within seven (7) calendar days after the delay occurs, of a Time Impact Analysis which demonstrates the estimated impact on the end date of the Work; is based upon the updated Construction Schedule current as of the month the delay occurred; and demonstrates that the delay cannot be mitigated, offset, or eliminated through such actions as revising the intended sequence of Work or other means.

If a time extension if granted by the CITY, the updated schedule reflecting the change shall become the baseline and be reflected schedule and must be shown and compared on all subsequent schedule submittals.

Since float time within the Construction Schedule is jointly owned, it is acknowledged that CITY caused delays on the project may be offset by CITY caused time savings (e.g. critical path submittals returned in less time than allowed by the Contract or approval of substitution requests which result in a savings of time to the CONTRACTOR). In such an event, the CONTRACTOR shall not be entitled to receive a time extension or delay damages until all CITY caused time savings are exceeded, and the Contract completion date is also exceeded.

F. If the initial schedule submitted shows completion of Work more than thirty (30) calendar days in advance of the Contract completion date, the ENGINEER may, at no cost to the CITY, decrease the Contract duration by issuance of a Change Order which changes appropriate Milestone Date(s) and the Contract completion date to the completion date reflected on the schedule. Any approved schedule, revision, or update having an early completion date shall show the time between the early completion date and the Contract completion date as "project float".

G. Comments made by the ENGINEER on the schedule during review will not relieve the CONTRACTOR from compliance with all requirements of the Contract. The ENGINEER may request that the CONTRACTOR and all major Subcontractors (defined herein as being any Subcontractor, Sub-Subcontractor, or Supplier with five (5) percent or more of the value of the Contract) participate in

review of any schedule submission. All revisions shall be submitted within seven (7) calendar days after the ENGINEER'S review.

H. Two copies of an updated schedule shall be submitted to the ENGINEER for approval with the submittal of each CONTRACTOR'S monthly payment request or the monthly payment request will be withheld. For those activities started but not yet completed at the time of submittal, the updated schedule shall reflect the percentage complete, as agreed between the CONTRACTOR and the INSPECTOR, and an estimate of the remaining duration. The monthly update of the schedule shall include an updated bar chart with logic arrows or network diagram and include the same additional data as required by Section 1.C. If the CPM network option is used, the schedule shall be calculated using remaining durations and the progress override option. The monthly update shall also include a complete, hard copy list of all the changes made from the previously approved submittal. If the schedule is done using Primavera, use a Claim Digger report for the list of changes.

I. The submittal of an updated schedule which meets the requirements of this Section, accurately reflects the status of the Work (for all previously accepted activities), and incorporates all approved changes into the schedule, shall be a condition precedent to the processing of the monthly payment application. (Actual and/or forecast dates for status of additional submittal cycles shall be added without the prior approval of the Engineer.) Updated schedules shall also be submitted at such other times as the ENGINEER may direct. Upon approval of a Change Order or issuance of a notice to proceed with a change, the approved change shall be reflected in the next schedule update.

J. If completion of any part of the Work, delivery of equipment or materials, or submittal of CONTRACTOR submittals is behind schedule and will impact the end date of the Work, the CONTRACTOR shall submit a written recovery plan acceptable to the ENGINEER for completing the Work by the current Contract completion date, if requested by the ENGINEER.

K. As a condition precedent to the release of any retained funds, the CONTRACTOR shall, after substantial completion of the Work has been achieved, submit a certified, final schedule which accurately reflects the manner in which the project was constructed and includes actual start and completion dates for all activities on the schedule.

END OF SECTION

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SECTION 01322 CONSTRUCTION PROGRESS PHOTOGRAPHY

1.1 GENERAL

A. Required**:** Provide photographs taken at the Jobsite at the specified stages of Contracted Work in accordance with provisions of this Section.

1. The Contractor shall provide the City with photos with addresses identifying each property location, the direction the photograph was taken (facing North, South etc).

2. Take first photographs just before CONTRACTOR starts any work operations at the Jobsite.

3. Take final photographs when all Contracted Work has been completed, regardless of time interval since previous photographs were taken.

1.2 SUBMITTALS

Except as otherwise directed by the ENGINEER, submit all photographs electronically on a CD/DVD organized by phase of construction and location.

1.3 QUALITY ASSURANCE

Photographs and prints to be of professional quality; clear, in focus, with high resolution and sharpness, and with minimum distortion.

END OF SECTION

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SECTION 01323 CONSTRUCTION STATUS REPORTS

1.1 REQUIREMENTS

A. Daily Status Report

The Contractor shall complete a daily report indicating manpower, major equipment, subcontractors, unusual occurrences and etc., involved in the performance of the work. The daily report shall be completed on forms prepared by the Contractor and approved by the City and shall be submitted to the Project Manager at the conclusion of each work week.

The Contractor shall also have workers on the project sign in and out each day on the City of Redlands Daily Sign In Sheet which shall state the name, times in and out and the work performed by each worker on the project each day. The completed Daily Sign In Sheets shall be submitted to the City of Redlands Project Manager at the end of each work week. Failure to submit daily reports and daily sign in sheets to the Project Manager on a weekly basis will result in a possible and temporary suspension of work until reports are submitted.

B. Weekly Status Report

During the construction phase of the Work, the CONTRACTOR shall submit weekly written status reports to the ENGINEER and the INSPECTOR. The report shall contain a record of inspections and tests, not performed by CITY forces, for all Work accomplished subsequent to the previous report and shall include the following information:

1. Type of work under way during the time frame of the report (e.g., earthwork, concrete work, structural steel erection, equipment manufacturing, component installation).

2. Inspections and tests, and location of inspections and tests that were made.

3. Results of inspections.

4. Reports of tests performed, including those specified, with the results of the tests, and acceptance criteria, including failures and remedial action to be taken. Test results, including all computations, shall be attached to the report form. Where test results cannot be completed by the time the report is submitted, a notation shall be made that the test was performed, including the approximate expected date that test results will be reported.

5. Report of any nonconforming items/activities. Nonconformance report forms designed solely for this purpose shall be utilized.

6. Results of inspections of material and equipment done upon their arrival at the Jobsite and prior to their incorporation into the Work. This includes, but is not limited to, compliance with approved submittals, damage, and proper storage requirements.

7. Offsite quality control activities.

8. Instructions received from the ENGINEER or INSPECTOR.

9. In all cases, the report must be verified and signed by the CONTRACTOR'S representative. The verification is to contain the statement that all supplies and materials incorporated in the Work are in compliance with the terms of the Contract except where noted.

C. 3 Week Look Ahead Schedule

During the construction phase of the Work, the CONTRACTOR shall submit 3 Week Look Ahead reports to the ENGINEER at the weekly progress meetings or as directed by the ENGINEER. The report shall include the following information:

1. Type of work under way during the time frame of the report (e.g., earthwork, concrete work, structural steel erection, equipment manufacturing, component installation).

D. Miscellaneous Submittals

CONTRACTOR shall prepare a Daily Construction Report recording the following information concerning events at the job-site and submit original copies to the ENGINEER at weekly intervals for approval:

1. List of Subcontractors and Sub-Subcontractors at the site**,** types of works and job location.

2. Count of CONTRACTOR’S personnel at the site**,** name, type of work, hours completed and job location.

3. Construction equipments at the site.

4. High and low temperatures, general weather conditions.

END OF SECTION

SECTION 01330 SUBMITTALS

1.1 THE REQUIREMENT

A. The CONTRACTOR shall furnish a schedule and list of all required submittals to the ENGINEER, including required submittals by all Subcontractors.

B. Wherever called for in these Specifications or on the plans, or where required by the ENGINEER, the CONTRACTOR shall furnish to the ENGINEER for review, two (2) hard copies and one electronic (PDF) copy of each submittal. The term "submittal" as used herein shall be understood to include detail design calculations, design drawings, shop drawings, fabrication and installation drawings, erection drawings, lists, graphs, operating instructions, catalog sheets, data sheets, samples, and similar items. Unless otherwise required, said submittals shall be submitted to the ENGINEER at a time sufficiently early to allow review of same by the ENGINEER and to accommodate the rate of Construction Progress required under the Contract without delaying the Contract Work and with due regard for the possibility of resubmittals. All submittals shall be in English.

C. All design or shop drawings or other submittals shall be accompanied by a transmittal form for each submittal. Any submittal not accompanied by such a form may be returned, at the ENGINEER'S discretion, for resubmittal.

D. Normally, a separate transmittal form shall be used for each specific item or class of material or equipment for which a submittal is required. Transmittal of a submittal of various items using a single transmittal form will be permitted only when the items taken together constitute a manufacturer's "package" or are so functionally related that expediency indicates a review of the group or package as a whole. A multiple-page submittal shall be collated into sets, and each set shall be stapled or bound, as appropriate, prior to transmittal to the ENGINEER.

E. Shop Drawings shall show in detail the size, sections, and dimensions of all the member(s); the arrangement and construction of all connections and joints; all holes, straps, and other fittings required for attaching work and other pertinent details. When required, engineering computations shall be submitted. The CONTRACTOR shall be responsible for delivering reviewed copies of shop Drawings to all others whose work is dependent thereon. The CONTRACTOR shall maintain at the site of the Project, at all times, a complete file of approved Shop Drawings and manufacturers' data for this Project.

F. Except as may otherwise be provided herein, the ENGINEER will return prints of each submittal to the CONTRACTOR, with its comments noted thereon, within twenty (20) calendar days following their receipt by the ENGINEER. It is considered reasonable that the CONTRACTOR shall make a complete and acceptable submittal to the ENGINEER by the second submission of a submittal

item. The CITY reserves the right to withhold moneys due the CONTRACTOR to cover additional costs of the ENGINEER'S review beyond the second submittal. Submittal will be returned to the CONTRACTOR with one of four (4) markings:

1. If a submittal is returned to the Contractor marked "NO EXCEPTIONS," formal revision and resubmission of said submittal will not be required.

2. If a submittal is returned to the Contractor marked "EXCEPTIONS NOTED," formal revision and resubmission of said submittal will not be required, unless specifically requested.

3. If a submittal is returned to the Contractor marked "RETURNED FOR CORRECTION," the Contractor shall revise said submittal and shall resubmit the originally required number of copies of said revised submittal to the Engineer.

4. If a submittal is returned to the Contractor marked "NOT ACCEPTABLE," the Contractor shall revise said submittal and shall resubmit the originally required number of copies of said revised submittal to the Engineer.

G. All Work for which Shop Drawings are required shall be performed in accordance with the reviewed and approved copies. Fabrication of an item shall not commence before the ENGINEER has reviewed the pertinent submittal and returned the copies to the CONTRACTOR marked either "NO EXCEPTIONS TAKEN," or "MAKE CORRECTIONS NOTED". Revisions indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as the basis for claims for extra work.

H. All CONTRACTOR submittals shall be carefully reviewed by an authorized representative of the CONTRACTOR prior to submission to the ENGINEER. Each submittal shall be dated, signed, and certified by the CONTRACTOR as being correct and in strict conformance with the Contract Documents. No consideration for review by the ENGINEER of any CONTRACTOR'S submittal will be made for any items which have not been so certified by the CONTRACTOR. All noncertified submittals will be returned to the CONTRACTOR without action taken by the ENGINEER, and any delays caused thereby shall be the total responsibility of the CONTRACTOR.

I. Should the Shop Drawings or manufacturers data (for submittals required by the Standard Specifications or the specifications) show variations from the Contract requirements, the CONTRACTOR shall make specific mention of such variations in the letter of transmittal, in order that, if acceptable, suitable action may be taken for proper adjustment of the Contract; otherwise the

CONTRACTOR will not be relieved of the responsibility for executing the work in accordance with the Contract Documents, and the approved submittals.

J. The ENGINEER'S review of CONTRACTOR'S submittal shall not relieve the CONTRACTOR of the entire responsibility for the correctness of details and dimensions and conformance to the Specifications. The CONTRACTOR shall assume all responsibility and risk for any misfits due to any errors in the submittal. Any fabrication or other work performed in advance of the receipt of accepted submittals shall be entirely at the CONTRACTOR'S risk and expense. The CONTRACTOR shall be responsible for the dimensions and the design of adequate connections and details.

K. CONTRACTOR'S Coordination:

1. ENGINEER will return and will not review unrelated submittals.

2. The CONTRACTOR may be required to provide drawings, setting diagrams and similar information necessary for proper coordination of Contracted Work. Such data shall remain between the CONTRACTOR and CONTRACTOR'S Subcontractor and will not be reviewed by the ENGINEER unless specifically called for in the Contract Documents.

3. ENGINEER will not review any required Structural Shop Drawings, Structural Calculations, etc., not prepared or signed by a State of California licensed ENGINEER.

4. ENGINEER will return and will not review any submittal requiring coordination with other submittals until such other submittals or required information is received by the Consultant or ENGINEER.

L. CONTRACTOR'S Submittals: CONTRACTOR'S submittals required for performance of Contracted Work, shall include, but are not limited to, the following:

1. Schedule of Values for all Lump Sum items within the Proposal.

2. Construction Schedule and Notification to ENGINEER of completion of each milestone or percentage increment of the Work as required.

3. Submittal Schedule

4. Daily Construction Reports

5. Shop Drawings and Structural Calculations

6. Manufacturer's Data and Specifications

7. Samples

8. Templates

9. Certificate of Compliance

10. Construction Photographs

11. Substitutions

12. Record Drawings and Record Project Manual

13. Operation & Maintenance Manuals

14. Stock Materials, Spare Parts, Tools

15. Material Testing Results

16. Maintenance Logs and Maintenance Schedule

M. CONTRACTOR shall conform to the provisions of the Contract Document and as may be specifically directed by the ENGINEER.

1. Preparation and processing of submittals shall be coordinated with Contracted Work operations, which include fabrication, purchasing and delivery of work items so as not to delay Contracted Work operations.

2. In each copy of the Submittal, mark every applicable material, product, equipment, manufacturer's data, product information, color samples, rating or values, part and model numbers, etc. by red color circle. Each of the submittal items must be clearly distinguishable from other unrelated or similar items listed in the Manufacturer's Catalog or Technical Specifications, Manuals, etc.

N. Coordination and Submittals:

1. Carefully review and coordinate all aspects of each item being submitted.

2. Carefully review contract drawings and technical sections, verify all work as laid out or indicated meeting the applicable codes and standards.

3. Ensure ample time for reviewing and processing of the submittals by the CITY or other authorized agencies, delays resulting from improper and untimely submittals shall be the responsibility of the CONTRACTOR.

4. Verify that all such submittal items conform to the Project Manual requirements noted in the Technical Sections.

5. Verify all site conditions and provide all required dimensions and measurements in Shop Drawings.

6. Where necessary, review the CITY'S comments, make changes and resubmit to local governing agencies for approval. Furnish the ENGINEER copies of the approved plans or drawings for review.

O. CONTRACTOR shall affix to each submittal, the CONTRACTOR'S signature certifying that required coordination has been performed and include on an attached label for processing and recording action taken, noting the following:

1. Name of the Project

2. Date of the Submittal

3. Name and address of Consultant

4. Name and address of the CONTRACTOR

5. Name and address of the Subcontractor(s)

6. Name and address of the Supplier

7. Name and address of the Manufacturer

8. Reference to Specification Section Number and Title

9. Reference to Drawing Sheet Number and detail(s)

10. Submittal Number

11. Priority Number and expected return date

END OF SECTION

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THE CITY OF REDLANDS
MUNICIPAL UTILITIES AND ENGINEERING DEPARTMENT

SUBMITTAL COVER SHEET

Project Name:		**Submittal Number:**	
Project Number:		**Date of Submittal:**	
Submitted By:			

Submittal Title:	

Priority Type (Select One):	☐ Low	☐ Normal	☐ High

Submittal Type (Select One):	☐ Pre-Construction	☐ Post-Construction

Category (Select One):	
☐ Product Data	☐ Close-Out
☐ Shop Drawing	☐ Warranty
☐ Mock Up	☐ Test Report
☐ Sample	☐ Operation / Maintenance Manual
☐ Certification	☐ MSDS – Material Safety Data Sheets
☐ As-Built	

THE CITY OF REDLANDS
MUNICIPAL UTILITIES AND ENGINEERING DEPARTMENT

REQUEST FOR INFORMATION (RFI)

Project Name:		**RFI Number:**	
Project Number:		**Date of RFI:**	
Submitted By:			

RFI Title:	

Work Impact? (Select One):	☐ No	☐ Unknown
	☐ Yes – Work Impeded	☐ Yes – Work Stopped

Question:

Proposed Solution (Optional):

Requestor:

Signature: _____

Title: _____ **Date:** _____

SECTION 01572 EROSION CONTROL PLAN

Contractor shall comply with all laws, codes, ordinances and requirements of governing agencies regarding the discharge of pollutants, air and water pollution control and any other requirements for this project. Within 5 days of the Notice to Proceed, Contractor shall submit two (2) hardcopies of the draft Erosion Control Plan to the City for review. Any corrections or changes shall be made to the Erosion Control Plan, approved by the Engineer and implemented prior to any construction work on this project. The plan shall be updated as necessary or required for compliance purposes.

Payment for work on this item shall be made as a percentage of work completed at each monthly payment. All work under this item shall be as shown on the approved drawing accepted by the City prior to any work on the project. The Contractor shall have all work installed and inspected by the City prior to any work on the project.

Full compensation for this item shall be in accordance with all state and federal NPDES rules, regulations, requirements and laws and shall constitute all work for providing, installing, maintaining and removing all work as required for all excavations, earthwork, grading, grinding, paving, concrete, runoff containment, and any other work performed within the project boundaries.

END OF SECTION

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SECTION 01581 CONSTRUCTION INFORMATION SIGNS

1.1 THE REQUIREMENT

The City shall provide the Contractor with all required construction information signs for the project. The signs shall be installed at the locations noted in the plans, if included, or as otherwise directed by the Engineer. If the project consists of numerous sites, the construction information signs shall be relocated to each site as work progresses. The construction signs shall be installed the same day work commences on any construction site. If the sign is not installed prior to construction work beginning at a subsequent site, the City will install the information signs at the Contractor's expense.

The installation of each sign shall be the responsibility of the contractor to include mounting posts, hardware and any related incidentals to ensure the sign is placed in a safe and secure manner. For any sign required for multiple site projects, where the sign is frequently relocated and not anticipated to be installed in the ground on posts, the Contractor shall provide a Type III barricade for mounting. The contractor shall obtain approval from the Engineer following installation of the construction information sign. If the signs are installed in the ground with posts, proper vertical clearance shall be provided. The minimum vertical clearance shall be six feet within a parkway area and seven feet within the sidewalk.

The construction information sign shall remain visible at all times. The contractor shall replace stolen signs at their expense and maintain the signs, ensuring all graffiti, soil, paint, etc. is removed from the sign immediately. Upon completion of the project, each sign shall be removed and returned to the City. If the sign is not returned to the City at the completion of the project in the original condition, the cost of the sign shall be withheld from the final progress payment.

The Contractor shall notify Underground Service Alert (Dig alert) at least 2 working days, but not more than 14 calendar days, prior to performing any excavation.

Full compensation for furnishing all labor, equipment, materials, and tools required to perform the tasks noted above, and as ordered by the Engineer, shall be considered as being included in the various Contract items of work and no separate or additional compensation will be allowed, therefore.

END OF SECTION

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SECTION 01721 MOBILIZATION

1.1 THE REQUIREMENT

A. General

Whether Mobilization is included as a Contract Bid Item in the Bid Proposal Form or specified as part of the lump sum in the Contract Documents, the cost of labor, equipment, materials and incidentals for doing all the work in mobilization (in advance of construction operations and not directly attributable to any specific bid item) shall be included in the Contract Price Breakdown and progress payment estimate. If there is no mobilization bid item the CONTRACTOR shall submit to the INSPECTOR for approval the Contract Price Breakdown with the amount established for mobilization.

Mobilization shall include, but not be limited to, the following items, all as required for the proper performance and completion of the Work:

1. Obtaining all permits, licenses, insurance, and bonds. Providing copies to the ENGINEER.

2. Moving onto the Jobsite all of CONTRACTOR'S plant and equipment as required.

3. Erecting temporary buildings and other construction facilities.

4. Installing temporary construction power and wiring.

5. Establishing fire protection system for its temporary facilities.

6. Developing construction water supply.

7. Providing field office trailers for the CONTRACTOR, complete with all specified equipment, furnishings, utility services and required approvals from the CITY.

8. Providing sanitary facilities or connecting to onsite sanitary facilities as specified.

9. Providing for potable water facilities as specified. This includes a means by which all on site CONTRACTOR, Subcontractor or supplier personnel can wash their hands with soap.

10. Arranging for, and erection of, CONTRACTOR'S work and storage yards and sheds.

11. Submitting all required Subcontractor insurance certificates and bonds.

12. Posting all CAL/OSHA required notices and establishment of safety programs.

13. Furnishing of Construction Schedule, Contract Price Breakdown and Submittal Schedules.

14. Erecting all temporary fencing, including removal and disposal of existing temporary fencing.

END OF SECTION

SECTION 01722 SURVEYING

PART 1 - GENERAL

A. General

1. The CONTRACTOR shall be responsible for all surveys required to layout the Work and for the accuracy of all survey work for construction. The CONTRACTOR shall include the cost of all such survey work in their Bid. The CONTRACTOR shall have all construction surveying performed by a `Licensed Land Surveyor' or a `Civil Engineer' registered by the State of California to perform such work. The ENGINEER reserves the right to verify all survey work done by the CONTRACTOR.

2. The CONTRACTOR shall preserve the initial survey control points for the duration of their usefulness. Monumentation that is subject to disturbance or destruction shall be located and referenced prior to construction and relocated and referenced if necessary after construction, in accordance with the following requirements.

B. Construction Surveys

1. The CONTRACTOR shall provide all reference stakes and form checks necessary for construction and inspection of improvements. All construction staking shall be documented in cut sheets and provided to the ENGINEER. This staking may include but is not limited to: removals, joins, rough grade, slope, utilities, storm drains, sewers, curbs, walks, paving, wall and building stakes; and any other staking necessary for construction and inspection.

C. Reference Or Grade Stakes

1. A reference or grade stake shall be set for each grade change or angle point shown on the plan, standard plan, and shop drawing, in addition to the normal staking interval.

D. Form Checks

1. Forms shall be checked when durable points may be disturbed, removed, or are impractical to be used to verify the design location. The measured location shall be recorded in the survey field notes. All variations from the plan location shall be brought to the attention of the ENGINEER.

E. Staking Intervals and Offset Stake Lines

1. All staking intervals shall be in accordance as directed by the Engineer. Stake lines shall be set at an offset distance from the improvement to ensure proper grade, station, and alignment.

F. Utility Stakes

1. The CONTRACTOR shall provide stakes for all utilities, public or private, that require location or relocation, unless otherwise stated.

G. Additional Survey Work

1. The CONTRACTOR may be required to furnish additional survey work, such as profiles, restakes, Change Orders, etc., at the request of the ENGINEER or the INSPECTOR.

H. Accuracy

1. The CONTRACTOR shall use appropriate surveying methods to obtain the following standards: For fixed works (i.e. cast-in-place concrete; asphalt pavement, pipes and drains; and other items determined by the ENGINEER) the following survey standards shall be used. The absolute horizontal accuracy, in relationship to the Engineer's control, shall be such that the semimajor axis of its 95% error ellipse is ±0.015 foot or less. The absolute vertical accuracy, in relationship to the Engineer's control, shall be such that its standard deviation is ±0.015 foot or less. The relative horizontal accuracy of survey points within the Project shall be such that the semimajor axis of its 95% error ellipse is ±0.015 foot or less. The relative vertical accuracy of survey points within the Project shall be such that its standard deviation is ±0.015 foot or less.

2. For excavation purposes, the following survey standards shall be used. The absolute horizontal accuracy, in relationship to the Engineer's control, shall be such that the semimajor axis of its 95% error ellipse is ±0.1 foot or less. The absolute vertical accuracy, in relationship to the Engineer's control, shall be such that its standard deviation is ±0.1 foot or less. The relative horizontal accuracy of survey points within the Project shall be such that semimajor axis of the 95% error ellipse is ±0.1 foot or less. The relative vertical accuracy of survey points within the Project shall be such that its standard deviation is ±0.1 foot or less.

I. Survey/Inspector

1. The CONTRACTOR shall provide to the INSPECTOR those measurements and control points necessary to determine the location and

conformance to the plan, line, and grade of the improvements necessary for inspection purposes.

J. Survey Notes

1. The CONTRACTOR shall supply and keep notes on CITY standard format note sheets. The ENGINEER may request copies of, and otherwise review, survey notes at any time during the construction phase of the Project. Upon completion of the Project, the original survey notes shall become the property of the CITY and shall be delivered to the ENGINEER.

PART 2 – MONUMENT PRESERVATION GUIDELINES

A. New & Reconstruction Projects

1. Prior to Construction

a. The public survey records are to be researched for the location of all possible survey monuments within the scope of the project and copies shall be furnished to the survey crew.

b. The survey crew shall diligently search for all survey monuments of record above or below the surface, within the road right-of-way. It is suggested that this search would include the use of a metal detector. When the detector indicates the possibility of a buried survey monument, then digging below the surface to uncover the monument is required.

c. The survey crew shall properly reference all found survey monuments, which may be disturbed or covered during construction, to stable surface points.

d. The authorized surveyor shall properly complete a Corner Record or Record of Survey for the monuments noted in item c, above. Prior to the start of any construction work, the original or a print of the Corner Record or Record of Survey shall be submitted to the County Surveyor for review, signature and filing. A copy shall also be provided to the City prior to the start of construction to provide documentation that the requirement is met.

2. After Construction and Prior to Notice of Completion

a. All covered and disturbed monuments shall be reset with the same or more durable type of monument as the original, in the surface of the construction. Key monuments shall be a minimum 1” inside diameter iron pipe of appropriate length.

b. A monument box or other protective structure is recommended to be placed around key monuments (section corners, quarter section corners).

c. The authorized surveyor shall properly complete a Corner Record or Record of Survey for all set monuments with a change in character, including tag

number, and submit it to the County Surveyor for review, signature and filing. A copy shall also be provided to the City prior to the Notice of Completion to provide documentation that the requirement is met.

B. Overlay Projects

1. Prior To Construction

a. The public survey records are to be researched for the location of all possible survey monuments within the scope of the project and copies shall be furnished to the survey crew.

b. The survey crew shall diligently search for all survey monuments of record and on the surface of the road. It is suggested the search would include the use of a metal detector. When the detector indicates the possibility of a buried survey monument, then digging below the surface to uncover the monument within 2" of the road surface is recommended.

c. The survey crew shall properly reference found survey monuments, which may be disturbed or covered during construction, to stable surface points.

d. The authorized surveyor shall properly complete a Corner Record or Record of Survey for the monuments noted in item 3, above. Prior to the start of any construction work, the original or a print of the Corner Record or Record of Survey shall be submitted to the County Surveyor for review, signature and filing. A copy shall also be provided to the City prior to the start of construction to provide documentation that the requirement is met.

2. After Construction and Prior to Notice of Completion

a. All covered or disturbed monuments and surface monuments are reset in the new road surface, or a new monument is set in the new road surface above the buried one.

b. All existing monument boxes will be adjusted to grade or replaced, as appropriate.

c. A monument box or other protective structure should be placed around key monuments (section corners, quarter section corners).

d. The authorized surveyor shall properly complete a Corner Record or Record of Survey for all set monuments and existing monuments with a change in character, including tag number and submits it to the County Surveyor for review, signature and filing. A copy shall also be provided to the City prior to the Notice of Completion to provide documentation that the requirement is met.

C. Slurry Seal Projects

1. Prior To Construction

    a. The public survey records are to be researched for the location of all possible survey monuments within the scope of the project and copies furnished to for the survey crew.

    b. All monument boxes shall be located and steps taken to ensure that the survey monuments inside are readily accessible upon completion of the project.

    c. The survey crew shall diligently search for survey monuments on the surface of the roadway and identify said monuments recovered in the field to ensure that they will be protected. The survey crew shall inventory the monuments recovered in the field in a manner that allows for their recovery and inspection after construction.

2. After Construction and Prior to Notice of Completion

    a. All monument boxes shall be inspected, and appropriate action taken when needed, to ensure that the survey monuments inside are readily accessible.

    b. The survey crew shall review the inventory of found monuments by field inspection to ensure that all survey monuments are clean and exposed. Those monuments covered after construction is completed shall be uncovered.

D. Monument Tie Preservation

1. Prior To Construction

    a. All existing survey monument ties within the scope of the project shall be researched and identified prior to construction. Surveyor may obtain existing tie sheets from the City as available.

    b. If it is determined that all ties for a survey monument may be disturbed during construction, the Surveyor shall relocate the monument ties prior to construction, within improvements that will not be disturbed, and file the revised tie sheet with the City. A minimum of three tie points should reference each centerline monument, whenever possible.

2. After Construction and Prior to Notice of Completion

    a. If it is determined that the result of construction will not disturb all survey monument ties for a specific monument, the Surveyor shall replace all monument ties disturbed during construction per the following guidelines:

        i. Monument ties shall be placed during the finishing process of the concrete improvements.

ii. Monument ties shall be set below the elevation of the adjacent top of curb to provide protection from any future cleaning, maintenance or work around the tie.

iii. A minimum of three tie points should reference each centerline monument, whenever possible.

b. Once the construction is complete, the Surveyor shall prepare a revised tie sheet, and file with the City for all monument ties disturbed during the construction.

END OF SECTION

SECTION 01732 POTHOLING

1.1 THE REQUIREMENT

A. The CONTRACTOR shall conduct exploratory excavations by potholing to verify or to discover the actual locations and the size of existing underground utilities and improvements. The CONTRACTOR shall take care not to damage existing facilities during potholing operations. Any utility or existing facility (including those located by Underground Service Alert - USA) within 3 feet of any trench or excavation shall be potholed prior to starting the contract work in the vicinity. Potholing shall be done in each given area where excavation work is to occur at least fourteen (14) calendar days in advance of any excavation or construction in that area, to avoid possible delay in the progress of the Work.

B. Potholing shall consist of excavations at the locations of utilities or other underground facilities indicated on the Drawings, located by USA, or as directed by the ENGINEER. All costs of potholing operations for the utilities indicated on the Drawings shall be included in the CONTRACTOR'S Bid.

C. If an allowance for "Additional Potholing" has been established and included in the SCHEDULE OF WORK AND PRICES, this allowance shall only be used to reimburse the CONTRACTOR for potholing utilities not shown or otherwise referenced on the drawings, or as directed by the ENGINEER. If the total cost of the Work directed under the Additional Potholing allowance differ from the amount set forth in the SCHEDULE OF WORK AND PRICES, the Contract Price shall be adjusted by a Change Order. The adjustment shall be the difference between the total actual costs and the amount included in the Bid, as an additional amount due to the CONTRACTOR or a credit to the CITY, as appropriate.

D. In addition to the potholes indicated on the Drawings, or directed by the ENGINEER, the CONTRACTOR may opt to do further potholing deemed necessary at no additional cost to the CITY.

E. Potholing operations shall conform to all applicable requirements as to sidewall slopes, sheeting and shoring, and all other excavation and trenching provisions specified herein.

F. Potholes shall be identified and protected in accordance with the Engineer's instructions, the California Manual on Uniform Traffic Control Devices (MUTCD) and Work Area Traffic Control Handbook (WATCH) Standards.

G. The CONTRACTOR'S proposed method of potholing and schedule for potholing shall be submitted to the ENGINEER for approval, at least thirty (30) days prior to the commencement of operation. Any utilities damaged during potholing shall be immediately reported to the ENGINEER and INSPECTOR and repairs made immediately in accordance with the specifications.

H. A complete log of all potholes shall be kept by the CONTRACTOR, showing specific locations and dimensions of trenches. The log shall be verified by the INSPECTOR prior to the backfilling of the potholes. The verified log will be submitted to the ENGINEER and the INSPECTOR within two (2) working days after completion of potholing in each area. Payment for potholing utilities not shown or otherwise referenced on the drawings, or as directed by the ENGINEER will not be made unless these potholes are listed on the verified log.

I. The CONTRACTOR shall record the coordinates, elevations and dimensions of all utilities and improvements verified or discovered by potholing. The records shall be submitted to the ENGINEER within two (2) working days after the completion of potholing in each area. The records shall also include dates of the potholing operations and any additional discovered information or pertinent data.

J. Upon completion of potholing in each area, and after verification of the logs by the INSPECTOR, potholes shall be immediately backfilled and compacted in accordance with the specifications or restored as directed by the ENGINEER.

END OF SECTION

SECTION 01740 DEMOBILIZATION

1.1 THE REQUIREMENT

A. General

Whether Demobilization is included as a Contract Bid Item in the Bid Proposal Form or specified as part of the lump sum in the Contract Documents, the cost of labor, equipment, materials and incidentals for doing all the work in demobilization (upon completion of all contract work and not directly attributable to any specific bid item) shall be included in the Contract Price Breakdown and progress payment estimate. If there is no demobilization bid item the CONTRACTOR shall submit to the INSPECTOR for approval the Contract Price Breakdown with the amount established for demobilization.

Demobilization shall include, but not be limited to, the following items, all as required for the proper performance and completion of the Work:

1. Moving off of the Jobsite all of CONTRACTOR'S plant and equipment as required.

2. Dismantling and removing all temporary buildings and other construction facilities.

3. Dismantling and removing all temporary construction power and wiring.

4. Removing all sanitary facilities from the work site.

5. Remove all waste, debris, and rubbish caused by construction operations within the work area, adjacent properties and public roads.

6. Materials and equipment shall be removed from the site as soon as they are no longer necessary. Before the final inspection, the site shall be cleared of equipment, unused materials and rubbish so as to present a satisfactory clean and neat appearance. All cleanup costs shall be included in the CONTRACTOR'S Bid.

7. Dismantling and removal of all temporary fencing.

8. Provide City with all required As-Built drawings.

9. All required Corner Records have been filed with the County and all copies provided to the City per Section 01722 Surveying.

10. All items noted within the final inspection ("Punchlist") have been completed to the satisfaction of the City.

11. All project photographs as required within Section 01322 Construction Progress Photography have been provided.

12. Notice of Completion (NOC) will not be filed until all work is complete per this Section 01740.

END OF SECTION

TECHNICAL SPECIFICATIONS

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SECTION 02222 PROTECTING EXISTING UNDERGROUND UTILITIES

PART 1 - GENERAL

A. Description

This section includes materials and procedures for protecting existing underground utilities.

B. Related Work Specified Elsewhere

1. General Conditions

PART 2 - MATERIALS

A. Replacement in Kind

Except as indicated below or as specifically authorized by the Owner's Representative, reconstruct utilities with new material of the same size, type, and quality as that removed.

B. Vitrified Clay Sewer Pipe and Couplings

For sewer pipe 8 inches in diameter or under, replacement shall consist of plain-end pipe conforming to ASTM C 700. Compression couplings shall conform to ASTM C 594, band seal couplings or equal. Use at least two lengths of pipe in crossing the trench section as shown on the details in the drawings.

PART 3 - EXECUTION

A. General

1. Replace in kind street improvements, such as curbs and gutters, barricades, traffic islands, signalization, fences, signs, etc., that are cut, removed, damaged, or otherwise disturbed by the construction.

2. Where utilities are parallel to or cross the construction but do not conflict with the permanent work to be constructed, follow the procedures given below and as indicated in the drawings. Notify the utility owner 48 hours in advance of the crossing construction and coordinate the construction schedule with the utility owner's requirements. For utility crossings not shown in the drawings, refer to the General Conditions and the instructions of the Owner's Representative for guidance.

3. Determine the true location and depth of utilities and service connections which may be affected by or affect the work. Determine the type, material, and condition of these utilities. In order to provide sufficient lead time to resolve unforeseen conflicts, order materials and take appropriate measures to ensure that there is no delay in work.

4. Expose utilities 1,300 feet in advance of the pipeline construction.

B. Procedures

1. Protect in Place: Protect utilities in place, unless abandoned, and maintain the utility in service, unless otherwise specified in the drawings or in the specifications.

2. Cut and Plug Ends: Cut abandoned utility lines and plug the ends. Plug storm drains and sewers with an 8-inch wall of brick and mortar. Cap waterlines with a cast-iron cap or install a 3-foot-long concrete plug. Dispose of the cut pipe as unsuitable material.

3. Remove and Reconstruct: Where so indicated in the drawings or as required by the Owner's Representative, remove the utility and, after passage, reconstruct it with new materials. Provide temporary service for the disconnected utility.

C. Compaction

1. Utilities Protected in Place: Backfill and compact under and around the utility so that no voids are left.

2. Utilities Reconstructed: Prior to replacement of the utility, backfill the trench and compact to an elevation 1 foot above the top of the ends of the utility. Excavate a cross trench of the proper width for the utility and lay, backfill, and compact.

3. Alternative Construction--Sand Slurry: Sand slurry consisting of one sack (94 pounds) of portland cement per cubic yard of sand and sufficient moisture for workability may be substituted for other backfill materials to aid in reducing compaction difficulties. Submit specific methods and procedures for the review of the Owner's Representative prior to construction.

4. The protection of the utility during construction.

D. Thrust Blocks on Waterlines

Note that restrained joints is the required method of controlling thrust restraint on this project except where shown on the plans or as approved otherwise by the City of Redlands.

1. The Contractor's attention is called to thrust blocks delineated in the drawings for waterlines throughout the project whose thrust is in the direction of the new excavation and, therefore, may be affected by the construction. These waterlines are

owned and operated by the Owner. Protect thrust blocks in place or shore to resist the thrust by a means approved by the Owner and reconstruct. If the thrust blocks are exposed or rendered to be ineffective in the opinion of the Owner's Representative, reconstruct them to bear against firm unexcavated or backfill material.

2. Provide firm support by backfilling that portion of the trench for a distance of 2 feet on each side of the thrust block to be reconstructed from the pipe bedding to the pavement subgrade, with either:

   a. Sand-cement slurry (94 pounds of cement per cubic yard).

   b. The native material compacted to a relative compaction of 95%.

3. Then excavate the backfill material for construction of the thrust block.

4. Test compaction of the backfill material before pouring any concrete thrust block. Use Class 560-C-3250 concrete for reconstruction.

E. Adjacent Parallel Utilities

1. The Contractor's attention is called to utilities throughout the project that are parallel to the proposed utility.

2. The position of these utilities is just outside the new construction. Protect these utilities from any disturbances and repair the lines and associated vaults and appurtenances if they are damaged in any way. All costs incurred for protection of these lines or any costs incurred due to the presence of the lines, whether or not they lie within the new construction, shall be borne in full by the Contractor.

END OF SECTION

SECTION 09900 METAL SURFACE PAINTING AND COATING

PART 1 - GENERAL

A. Description

This section includes materials and application of painting and coating systems for the following surfaces:

1. Submerged metal.
2. Exposed metal.
3. Buried metal.

For coating specifications pertaining to welded steel reservoirs, see Section 09902, Welded Steel Tank Coating.

B. Submittals

1. Submit shop drawings in accordance with the Section 01330.
2. Submit manufacturer’s data sheets showing the following information:
    a. Percent solids by volume.
    b. Minimum and maximum recommended dry-film thickness per coat for prime, intermediate, and finish coats.
    c. Recommended surface preparation.
    d. Recommended thinners.
    e. Statement verifying that the specified prime coat is recommended by the manufacturer for use with the specified intermediate and finish coats.
    f. Application instructions including recommended equipment and temperature limitations.
    g. Curing requirements and instructions.
3. Submit color swatches.
4. Submit certificate identifying the type and gradation of abrasives used for surface preparation.
5. Submit material safety data sheets for each coating.

PART 2 - MATERIALS

A. Painting and Coating Systems

The following index lists the various painting and coating systems by service and generic type:

PAINT COATINGS SYSTEM INDEX

No.	Title	Generic Coating
	Submerged Metal Coating Systems	
7.	Submerged Metal, Potable or Nonpotable Water	Epoxy
	Exposed Metal Coating Systems	
10.	Exposed Metal, Corrosive Environment	High-build epoxy (two-coat system) with polyurethane topcoat
	Buried Metal Coating Systems	
21.	Buried Metal	Epoxy
24.	Buried Metal	Corrosion-resisting grease
	Coating Systems for Non-Ferrous Metals	
54.	Aluminum Insulation from Concrete and Carbon Steel	Epoxy

These systems are specified in detail in the following paragraphs. For each coating, the required surface preparation, prime coat, intermediate coat (if required), topcoat, and coating thicknesses are described. Mil thicknesses shown are minimum dry-film thicknesses.

B. Submerged Metal Coating Systems

1. System No. 7--Submerged Metal, Potable or Nonpotable Water:

Type: Epoxy.

Service Conditions: For use with structures, valves, piping, or equipment immersed in potable or nonpotable water.

Surface Preparation: SSPC SP-10.

Coating System: Apply the manufacturer's recommended number of coats to attain the specified minimum coating thickness. Products: Devoe Bar-Rust 233H, Tnemec Series N140, Sherwin-Williams Tank Clad HS B62-80, Carboline Super Hi-Gard 891, Ameron 395, International Interline 785HS, Wisconsin Protective Coating Corp. Plasite 7133 or 9133, Keysite 740, Scotchkote 306, Engard 460 HS, or equal; 16 mils total. Color of topcoat: white.

C. Exposed Metal Coating Systems

1. System No. 10--Exposed Metal, Corrosive Environment:

Type: High-build epoxy finish coat having a minimum volume solids of 60%, with an inorganic zinc prime coat.

Service Conditions: For use with metal structures or pipes subjected to water condensation; chemical fumes, such as hydrogen sulfide; salt spray; and chemical contact.

Surface Preparation: SSPC SP-10.

Prime Coat: Self-curing, two-component inorganic zinc-rich coating recommended by the manufacturer for overcoating with a high-build epoxy finish coat. Minimum zinc content shall be 12 pounds per gallon. Apply to a thickness of 3 mils. Products: Tnemec 90-96, Devoe Catha-Coat 304 or 304V, International Interzinc 180HS, Ameron 9HS, Engard 519, Carboline 11 HS, Sherwin-Williams Zinc-Clad II Plus, or equal.

Finish Coat: Tnemec 104, ICI Devoe Devran 224 HS, International Interguard 760HS, Ameron 385, Engard 460 HS, Carboline 888 or 890, Sherwin-Williams Macropoxy 646 B58-600, or equal; 5 mils.

D. Buried Metal Coating Systems

1. System No. 21--Buried Metal:

Type: High solids epoxy or phenolic epoxy having a minimum volume solids of 80% (ASTM D 2697).

Service Conditions: Buried metal, such as valves, flanges, bolts, nuts, structural steel, and fittings.

Surface Preparation: SSPC SP-10.

Coating System: Apply three or more coats of Ameron 400, Tnemec 104 HS, Engard 480 HS, ICI Devoe Bar-Rust 233H, Carboline 890LT, Sherwin-Williams

Tank Clad HS B62-80 series, or equal; 30 mils total. Maximum thickness of an individual coating shall not exceed the manufacturer's recommendation.

2. System No. 24--Buried Metal:

Type: Corrosion-resisting grease.

Service Conditions: Buried metal, such as bolts, bolt threads, tie rods, and nuts.

Surface Preparation: SSPC SP-3 or SP-6.

Coating: NO-OX-ID GG-2 as manufactured by Sanchem, Inc. Apply to a minimum thickness of 1/4 inch.

E. Coating Systems for Non Ferrous Metals

1. System No. 54--Aluminum Insulation from Concrete and Carbon Steel:

Type: High solids epoxy or phenolic epoxy having a minimum volume solids of 80% (ASTM D 2697).

Service Conditions: Coat areas of aluminum grating, stairs, structural members or aluminum fabrications, in contact with concrete or carbon steel with this system.

Surface Preparation: Solvent or steam cleaning per SSPC SP-1; do not use alkali cleaning. Then dust blast.

Coating System: Apply three or more coats of Ameron 400, Tnemec 100, ICI Devoe Bar-Rust 233H, Sherwin-Williams Macropoxy B58-600, or equal; 30 mils total. Maximum thickness of an individual coating shall not exceed the manufacturer's recommendation.

F. Abrasives for Surface Preparation

1. Abrasives used for preparation of ferrous (excluding stainless steel) surfaces shall be one of the following:

a. 16 to 30 or 16 to 40 mesh silica sand or mineral grit.

b. 20 to 40 mesh garnet.

c. Crushed iron slag, 100% retained on No. 80 mesh.

d. SAE Grade G-40 or G-50 iron or steel grit.

PART 3 - EXECUTION

A. Weather Conditions

1. Do not paint in the rain, wind, snow, mist, and fog or when steel or metal surface temperatures are less than 5°F above the dew point.

2. Do not apply paint when the relative humidity is above 85%.

3. Do not paint when temperature of metal to be painted is above 120°F.

4. Do not apply alkyd, inorganic zinc, silicone aluminum, or silicone acrylic paints if air or surface temperature is below 40°F or expected to be below 40°F within 24 hours.

5. Do not apply epoxy, acrylic latex, and polyurethane paints on an exterior or interior surface if air or surface temperature is below 60°F or expected to drop below 60°F in 24 hours.

B. Surface Preparation Procedures

1. Remove oil and grease from metal surfaces in accordance with SSPC SP-1. Use clean cloths and cleaning solvents and wipe dry with clean cloths. Do not leave a film or greasy residue on the cleaned surfaces before abrasive blasting.

2. Do not abrasive blast or prepare more surface area in one day than can be coated in one day; prepare surfaces and apply coatings the same day. Remove sharp edges, burrs, and weld spatter.

3. For carbon steel, do not touch the surface between the time of abrasive blasting and the time the coating is applied. Apply coatings within two hours of blasting or before any rust bloom forms.

4. Surface preparation shall conform with the SSPC specifications as follows:

Solvent Cleaning	SP-1
Hand Tool Cleaning	SP-2
Power Tool Cleaning	SP-3
White Metal Blast Cleaning	SP-5
Commercial Blast Cleaning	SP-6
Brush-Off Blast Cleaning	SP-7
Pickling	SP-8
Near-White Blast Cleaning	SP-10
Power Tool Cleaning to Bare Metal	SP-11
Surface Preparation and Cleaning of Steel and Other Hard Materials by High- and Ultrahigh-Pressure Water Jetting Prior to Recoating	SP-12
Surface Preparation of Concrete	SP-13

5. Wherever the words “solvent cleaning,” “hand tool cleaning,” “wire brushing,” or “blast cleaning” or similar words are used in these specifications or in paint manufacturer’s specifications, they shall be understood to refer to the applicable SSPC (Steel Structure Painting Council), surface preparation specifications listed above.

6. For carbon steel surfaces, after abrasive blast cleaning, the height of the surface profile shall be 2 to 3 mils. If this cannot be achieved with the surface preparation named in the painting system, SSPC SP-5 may be required. Verify the surface profile by measuring with an impresser tape acceptable to the Owner’s Representative. Perform a minimum of one test per 100 square feet of surface area. Testing shall be witnessed by the Owner’s Representative. The impresser tape used in the test shall be permanently marked with the date, time, and locations where the test was made. Test results shall be promptly presented to the Owner’s Representative.

7. Do not apply any part of a coating system before the Owner’s Representative has reviewed the surface preparation. If coating has been applied without this review, if directed by the Owner’s Representative, remove the applied coating by abrasive blasting and reapply the coat in accordance with this specification.

C. Abrasive Blast Cleaning

1. Use dry abrasive blast cleaning for metal surfaces. Do not use abrasives in automatic equipment that have become contaminated. When shop or field blast cleaning with handheld nozzles, do not recycle or reuse blast particles.

2. After blast cleaning and prior to application of coating, dry clean surfaces to be coated by dusting, sweeping, and vacuuming to remove residue from blasting. Apply the specified primer or touch-up coating within the period of an eight-hour

working day. Do not apply coating over damp or moist surfaces. Reclean prior to application of primer or touch-up coating any blast cleaned surface not coated within said eight-hour period.

3. Keep the area of the work in a clean condition and do not permit blasting particles to accumulate and constitute a nuisance or hazard.

4. During sandblast cleaning, prevent damage to adjacent coatings. Schedule blast cleaning and coating such that dust, dirt, blast particles, old coatings, rust, mill scale, etc., will not damage or fall upon wet or newly coated surfaces.

D. Procedures for Items Having Shop-Applied Prime Coats

1. After application of primer to surfaces, allow coating to cure for a minimum of two hours before handling to minimize damage.

2. When loading for shipment to the project site, use spacers and other protective devices to separate items to prevent damaging the shop-primed surfaces during transit and unloading. If wood spacers are used, remove wood splinters and particles from the shop-primed surfaces after separation. Use padded chains or ribbon binders to secure the loaded items and minimize damage to the shop-primed surfaces.

3. Cover shop-primed items 100% with protective coverings or tarpaulins to prevent deposition of road salts, fuel residue, and other contaminants in transit.

4. Handle shop-primed items with care during unloading, installation, and erection operations to minimize damage. Do not place or store shop-primed items on the ground or on top of other work unless ground or work is covered with a protective covering or tarpaulin. Place shop-primed items above the ground upon platforms, skids, or other supports.

E. Field Touch-Up of Shop-Applied Prime Coats

1. Remove oil and grease surface contaminants on metal surfaces in accordance with SSPC SP-1. Use clean rags wetted with a degreasing solution, rinse with clean water, and wipe dry.

2. Remove dust, dirt, salts, moisture, chalking primers, or other surface contaminants that will affect the adhesion or durability of the coating system. Use a high-pressure water blaster or scrub surfaces with a broom or brush wetted with a solution of trisodium phosphate, detergent, and water. Before applying intermediate or finish coats to inorganic zinc primers, remove any soluble zinc salts that have formed by means of scrubbing with a stiff bristle brush. Rinse scrubbed surfaces with clean water.

3. Remove loose or peeling primer and other surface contaminants not easily removed by the previous cleaning methods in accordance with SSPC SP-7. Take care that remaining primers are not damaged by the blast cleaning operation. Remaining

primers shall be firmly bonded to the steel surfaces with blast cleaned edges feathered.

4. Remove rust, scaling, or primer damaged by welding or during shipment, storage, and erection in accordance with SSPC SP-10. Take care that remaining primers are not damaged by the blast cleaning operation. Areas smaller than 1 square inch may be prepared per SSPC SP-11. Remaining primers shall be firmly bonded to the steel surfaces with cleaned edges feathered.

5. Use repair procedures on damaged primer that protects adjacent primer. Blast cleaning may require the use of lower air pressure, smaller nozzles, and abrasive particle sizes, short blast nozzle distance from surface, shielding, and/or masking.

6. After abrasive blast cleaning of damaged and defective areas, remove dust, blast particles, and other debris by dusting, sweeping, and vacuuming; then apply the specified touch-up coating.

7. Surfaces that are shop primed with inorganic zinc primers shall receive a field touch-up of organic zinc primer per System No. 18 to cover scratches or abraded areas.

8. Surfaces that are shop primed shall receive a field touch-up of the same primer used in the original prime coat.

F. Painting Systems

1. All materials of a specified painting system, including primer, intermediate, and finish coats, shall be produced by the same manufacturer. Thinners, cleaners, driers, and other additives shall be as recommended by the paint manufacturer for the particular coating system.

2. Deliver paints to the jobsite in the original, unopened containers.

G. Paint Storage and Mixing

1. Store and mix materials only in areas designated for that purpose by the Owner's Representative. The area shall be well-ventilated, with precautionary measures taken to prevent fire hazards. Post "No Smoking" signs. Storage and mixing areas shall be clean and free of rags, waste, and scrapings. Tightly close containers after each use. Store paint at an ambient temperature from 50°F to 100°F.

2. Prepare multiple-component coatings using all of the contents of the container for each component as packaged by the paint manufacturer. Do not use partial batches. Do not use multiple-component coatings that have been mixed beyond their pot life. Provide small quantity kits for touch-up painting and for painting other small areas. Mix only the components specified and furnished by the paint manufacturer. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.

H. Procedures for the Application of Coatings

1. Conform to the requirements of SSPC PA-1. Follow the recommendations of the coating manufacturer including the selection of spray equipment, brushes, rollers, cleaners, thinners, mixing, drying time, temperature and humidity of application, and safety precautions.

2. Stir, strain, and keep coating materials at a uniform consistency during application. Power mix components. For multiple component materials, premix each component before combining. Apply each coating evenly, free of brush marks, sags, runs, and other evidence of poor workmanship. Use a different shade or tint on succeeding coating applications to indicate coverage where possible. Finished surfaces shall be free from defects or blemishes.

3. Do not use thinners unless recommended by the coating manufacturer. If thinning is allowed, do not exceed the maximum allowable amount of thinner per gallon of coating material. Stir coating materials at all times when adding thinner. Do not flood the coating material surface with thinner prior to mixing. Do not reduce coating materials more than is absolutely necessary to obtain the proper application characteristics and to obtain the specified dry-film thicknesses.

4. Remove dust, blast particles, and other debris from blast cleaned surfaces by dusting, sweeping, and vacuuming. Allow ventilator fans to clean airborne dust to provide good visibility of working area prior to coating applications. Remove dust from coated surfaces by dusting, sweeping, and vacuuming prior to applying succeeding coats.

5. Apply coating systems to the specified minimum dry-film thicknesses as measured from above the peaks of the surface profile.

6. Apply primer immediately after blast cleaning and before any surface rusting occurs, or any dust, dirt, or any foreign matter has accumulated. Reclean surfaces by blast cleaning that have surface colored or become moist prior to coating application.

7. Apply a brush coat of primer on welds, sharp edges, nuts, bolts, and irregular surfaces prior to the application of the primer and finish coat. Apply the brush coat prior to and in conjunction with the spray coat application. Apply the spray coat over the brush coat.

8. Before applying subsequent coats, allow the primer and intermediate coats to dry for the minimum curing time recommended by the manufacturer. In no case shall the time between coats exceed the manufacturer’s recommendation.

9. Each coat shall cover the surface of the preceding coat completely, and there shall be a visually perceptible difference in applied shade or tint of colors.

10. Applied coating systems shall be cured at 75°F or higher for 48 hours. If temperature is lower than 75°F, curing time shall be in accordance with printed recommendations of the manufacturer, unless otherwise allowed by the Owner's Representative.

11. Assembled parts shall be disassembled sufficiently before painting or coating to ensure complete coverage by the required coating.

I. Surfaces Not To Be Coated

Do not paint the following surfaces unless otherwise noted in the drawings or in other specification sections. Protect during the painting of adjacent areas:

1. Concrete walkways.

2. Mortar-coated pipe and fittings.

3. Stainless steel.

4. Metal letters.

5. Glass.

6. Roofings.

7. Fencing.

8. Copper tubing, red brass piping, and PVC piping except where such piping occurs in rooms where the walls are painted or required for color coding.

9. Electrical fixtures except for factory coatings.

10. Nameplates.

11. Grease fittings.

12. Brass and copper, submerged.

13. Buried pipe, unless specifically required in the piping specifications.

14. Fiberglass items, unless specifically required in the FRP specifications.

15. Aluminum handrail, stairs, and grating.

J. Protection of Surfaces Not To Be Painted

Remove, mask, or otherwise protect hardware, lighting fixtures, switchplates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not intended to be painted. Provide drop cloths to prevent paint materials

from falling on or marring adjacent surfaces. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process. Mask openings in motors to prevent paint and other materials from entering the motors.

K. Surfaces To Be Coated

The exact coating to be applied in any location is not designated by the descriptive phrases in the coating system titles such as "corrosive environment," "buried metal," or "submerged metal." Coat surfaces with the specific coating systems as described below:

1. Coat aboveground and exposed piping or piping in vaults and structures as described in the various piping specifications. Color of finish coat shall be as selected by the Owner.

2. Coat valves as described in the various valve specifications.

3. Coat buried flanges, nuts and bolts, valves, flexible pipe couplings, exposed rebar in thrust blocks, and valve boxes per System No. 21. Coat buried bolt threads, tie bolt threads, and nuts per System No. 24.

L. Dry-Film Thickness Testing

1. Measure coating thickness specified for metal surfaces with a magnetic-type dry-film thickness gauge. Provide certification that the gauge has been calibrated by a certified laboratory within the past six months. Provide dry-film thickness gauge as manufactured by Mikrotest or Elcometer.

2. Test the finish coat of metal surfaces (except zinc primer and galvanizing) for holidays and discontinuities with an electrical holiday detector, low-voltage, wet-sponge type. Provide measuring equipment. Provide certification that the gauge has been calibrated by a certified laboratory within the past six months. Provide detector as manufactured by Tinker and Rasor or K-D Bird Dog.

3. For metal surfaces, make five separate spot measurements (average of three readings) spaced evenly over each 100 square feet of area (or fraction thereof) to be measured. Make three readings for each spot measurement of either the substrate or the paint. Move the probe or detector a distance of 1 to 3 inches for each new gauge reading. Discard any unusually high or low reading that cannot be repeated consistently. Take the average (mean) of the three readings as the spot measurement. The average of five spot measurements for each such 100 square foot area shall not be less than the specified thickness. No single spot measurement in any 100 square foot area shall be less than 80%, nor more than 120%, of the specified thickness. One of three readings which are averaged to produce each spot measurement may underrun by a greater amount.

4. Perform tests in the presence of the Owner's Representative.

M. Repair of Improperly Coated Surfaces

If the item has an improper finish color or insufficient film thickness, clean and topcoat the surface with the specified paint material to obtain the specified color and coverage. Sandblast or power-sand visible areas of chipped, peeled, or abraded paint, feathering the edges. Then prime and finish coat in accordance with the specifications. Work shall be free of runs, bridges, shiners, laps, or other imperfections.

N. Cleaning

1. During the progress of the work, remove discarded materials, rubbish, cans, and rags at the end of each day's work.

2. Thoroughly clean brushes and other application equipment at the end of each period of use and when changing to another paint or color.

3. Upon completion of painting work, remove masking tape, tarps, and other protective materials, using care not to damage finished surfaces.

END OF SECTION

SECTION 15050 GENERAL PIPING REQUIREMENTS

PART 1 - GENERAL

A. Description

This section describes the general requirements for selecting piping materials; selecting the associated bolts, nuts, and gaskets for flanges for the various piping services in the project; and miscellaneous piping items.

B. Submittals

1. Submit shop drawings in accordance with Section 01330.

2. Submit affidavit of compliance with referenced standards (e.g., AWWA, ANSI, ASTM, etc.).

3. Submit certified copies of mill test reports for bolts and nuts, including coatings if specified. Provide recertification by an independent domestic testing laboratory for materials originating outside of the United States.

4. Submit manufacturer's data sheet for gaskets supplied showing dimensions and bolting recommendations.

5. Submit manufacturer's data sheet for insulating unions, showing recommended installation procedures.

C. Definitions of Buried and Exposed Piping

1. Buried piping is piping buried in the soil, commencing at the wall or beneath the slab of a structure. Where a coating is specified, provide the coating up to the structure wall. Piping encased in concrete is considered to be buried. Do not coat encased pipe.

2. Exposed piping is piping in any of the following conditions or locations:

   a. Above ground.

   b. Inside buildings, vaults, or other structures.

   c. In underground concrete trenches or galleries.

PART 2 - MATERIALS

A. Materials Selection and Alternative Materials

1. The drawings may show alternative piping materials for certain services. In such cases, the same pipe material shall be used for all pipe sizes in all locations for the given piping service. Do not intermix piping materials.

B. Thread Forming for Stainless Steel Bolts

Form threads by means of rolling, not cutting or grinding.

C. Bolts and Nuts for Flanges for Steel and Ductile Iron Piping

1. Bolts and nuts for buried or submerged Class 150 flanges shall conform to ASTM A307 Grade B.

2. Not used

3. Bolts and nuts used in flange insulation kits shall conform to ASTM A307 Grade B.

4. Provide washers for each nut. Washers shall be of the same material as the nuts.

D. Lubricant for Stainless Steel Bolts and Nuts

Not used

E. Gaskets for Flanges for Steel and Ductile-Iron Piping and Fittings in Water Service

Gaskets shall be ring type, 1/8-inch thick, non-asbestos, aramid fibers with nitrile binder. Gaskets shall have "nominal" pipe size inside diameters not the inside diameters per ANSI B16.21. Products: Garlock Blue-Gard 3000, Tripac #5000 or equal.

PART 3 - EXECUTION

A. Installing Flanged Piping

1. Set pipe with the flange bolt holes straddling the pipe horizontal and vertical centerline. Install pipe without springing, forcing, or stressing the pipe or any adjacent connecting valves or equipment. Before bolting up, align flange faces to the design plane within 1/16 inch per foot measured across any diameter. Align flange boltholes within 1/8-inch maximum offset.

2. Clean flanges by wire brushing before installing flanged fittings. Clean flange bolts and nuts by wire brushing, lubricate carbon steel bolts with oil and graphite, and tighten nuts uniformly and progressively.

3. Bolt lengths shall extend completely through their nuts. Any which fail to do so shall be considered acceptably engaged if the lack of complete engagement is not more than one thread.

4. Do not use more than one gasket between contact faces in assembling a flanged joint.

5. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reset or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight.

END OF SECTION

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SECTION 15100 MANUAL, CHECK, PRESSURE REDUCING, AND PROCESS VALVES

PART 1 - GENERAL

A. Description

This section includes materials, testing, and installation of manually operated valves, check valves, pressure reducing, and process valves including gate and butterfly valves.

B. Related Work Specified Elsewhere

1. Painting and Coating: 09900.
2. General Piping Requirements: 15050.
3. Air-Release and Vacuum-Relief Valves: 15108.
4. Pressure Testing of Piping: 15144.

C. Submittals

1. Submit shop drawings in accordance with Section 01330.
2. Submit manufacturer's catalog data and detail construction sheets showing all valve parts. Describe each part by material of construction, specification (such as AISI, ASTM, SAE, or CDA), and grade or type.
3. Show valve dimensions including laying lengths. Show port sizes. Show dimensions and orientation of valve actuators, as installed on the valves. Show location of internal stops for gear actuators. State differential pressure and fluid velocity used to size actuators. For worm gear actuators, state the radius of the gear sector in contact with the worm and state the handwheel diameter.
4. Show valve linings and coatings. Submit manufacturer's catalog data and descriptive literature.
5. Submit copies of a report verifying that the valve interior linings and exterior coatings have been tested for holidays and lining thickness. Describe test results and repair procedures for each valve. Do not ship valves to project site until the reports have been returned by the Owner's Representative as approved.
6. For butterfly valves, show the clear diameter or size of the port. Show the actual area of the port as a percentage of the area as calculated for the nominal valve size.

PART 2 - MATERIALS

A. General

1. Install valves complete with operating handwheels or levers, chainwheels, extension stems, floor stands, gear actuators, operating nuts, chains, and wrenches required for operation.

2. Valves shall have the name of the manufacturer and the size of the valve cast or molded onto the valve body or bonnet or shown on a permanently attached plate.

3. For buried locations, valves with mechanical joint ends may be substituted for the flanged ends specified provided the mechanical joint ends are compatible with the pipe ends.

B. Valve Actuators

1. Provide 2-inch AWWA operating nuts for buried and submerged valves.

2. Provide enclosed gear actuators on butterfly, ball, and plug valves 8 inches and larger, unless electric valve actuators are shown in the drawings. Gear actuators for valves 8 inches through 20 inches shall be of the worm and gear, or of the traveling nut type.

3. Provide gear actuators on gate valves 14 inches and larger, unless electric valve actuators are shown in the drawings. Gear actuators shall be of the bevel or spur gear type. Provide grease case. Gearing shall comply with AWWA C500.

4. Design gear actuators assuming that the differential pressure across the plug or disc is equal to the pressure rating of the valve and assuming a line fluid temperature range of 50°F to 100°F unless otherwise required in the detailed valve specifications.

5. Gear actuators shall be enclosed, oil lubricated, with seals provided on shafts to prevent entry of dirt and water into the actuator. Gear actuators for valves located above ground or in vaults and structures shall have handwheels. The actuators for valves in exposed service shall contain a dial indicating the position of the valve disc or plug. Gear actuators for buried or submerged valves shall have 2-inch-square AWWA operating nuts.

6. For buried or submerged service, provide watertight shaft seals and watertight valve and actuator cover gaskets. Provide totally enclosed actuators designed for buried or submerged service.

7. Traveling nut and worm and gear actuators shall be of the totally enclosed design so proportioned as to permit operation of the valve under full differential pressure rating of the valve with a maximum pull of 80 pounds on the handwheel or crank.

Provide stop limiting devices in the actuators in the open and closed positions. Actuators shall be of the self-locking type to prevent the disc or plug from creeping. Design actuator components between the input and the stop-limiting devices to withstand without damage a pull of 200 pounds for handwheel or chainwheel actuators and an input torque of 300 foot-pounds for operating nuts when operating against the stops.

8. Handwheel diameters for traveling nut actuators shall not exceed 8 inches for valves 12 inches and smaller and shall not exceed 12 inches for valves 20 inches and smaller.

9. Self-locking worm gear shall be a one-piece design of gear bronze material (ASTM B 427; or ASTM B 584, Alloy C86200), accurately machine cut. Actuators for eccentric and lubricated plug valves may use ductile-iron gears provided the gearing is totally enclosed with spring-loaded rubber lip seals on the shafts. The worm shall be hardened alloy steel (ASTM A 322, Grade G41500 or G41400; or ASTM A 148, Grade 105-85), with thread ground and polished. Support worm gear shaft at each end by ball or tapered roller bearings. The reduction gearing shall run in a proper lubricant. The handwheel diameter shall be no more than twice the radius of the gear sector in contact with the worm. Worm gear actuators shall be Limitorque Model HBC, EIM Series W, or equal.

10. Design actuators on buried valves to produce the required torque on the operating nut with a maximum input of 150 foot-pounds.

11. Valve actuators, handwheels, or levers shall open by turning counterclockwise.

C. Cast-Iron Valve Boxes for Buried Valves

1. Valve cans shall be slip can type, 8” diameter with extension as manufactured by R.K. Industries, 20 GA. Galvanized steel, or approved equal. Cast iron gate cap to be manufactured by Dayton Foundry, or approved equal, and shall be marked “Water”. For detail see drawing A-20514, which is included in the Appendix.

2. Coat buried cast-iron pieces per Section 09900, System No. 21.

D. Extension Stems for Buried and Submerged Valve Actuators

1. Where the depth of the valve is such that its centerline is more than 4 feet below grade, provide operating extension stems to bring the operating nut to a point 6 inches below the surface of the ground and/or box cover. Where the valve is submerged, provide operating extension stems to bring the operating nut to 6 inches above the water surface. Extension stems shall be steel, solid core, and shall be complete with 2-inch-square operating nut. The connections of the extension stems to the operating nuts and to the valves shall withstand without damage a pull of 300 foot-pounds.

2. Extension stem diameters shall be as tabulated below:

Valve Size (inches)	Minimum Extension Stem Diameter (inches)
6	1
8	1-1/8
10, 12	1-1/4
14	1-3/8
16, 18	1-1/2

E. Bolts and Nuts for Flanged Valves

Bolts and nuts for flanged valves shall be as described in Section 15050.

F. Gaskets for Flanges

Gaskets for flanged end valves shall be as described in Section 15050.

G. Painting and Coating

1. Coat metal valves located above ground or in vaults and structures the same as the adjacent piping.

2. Coat buried metal valves at the place of manufacture per Section 09900, System No. 21.

3. Coat submerged metal valves, stem guides, extension stems, and bonnets at the place of manufacture per Section 09900, System No. 7.

4. Line the interior metal parts of metal valves 4 inches and larger, excluding seating areas and bronze and stainless steel pieces, per Section 09900, System No. 7. Apply lining at the place of manufacture.

5. Test the valve interior linings and exterior coatings at the factory with a low-voltage (22.5 to 80 volts, with approximately 80,000-ohm resistance) holiday detector, using a sponge saturated with a 0.5% sodium chloride solution. The lining shall be holiday free.

6. Measure the thickness of the valve interior linings per Section 09900. Repair areas having insufficient film thickness per Section 09900.

H. Packing, O-Rings, and Gaskets

Unless otherwise stated in the detailed valve specifications, packing, O-rings, and gaskets shall be one of the following nonasbestos materials:

1. Teflon.

2. Kevlar aramid fiber.

3. Acrylic or aramid fiber bound by nitrile. Products: Garlock "Bluegard," Klinger "Klingersil C4400," or equal.

4. Buna-N (nitrile).

I. Rubber Seats

Rubber seats shall be made of a rubber compound that is resistant to free chlorine and monochloramine concentrations up to 10 mg/l in the fluid conveyed.

J. Valves

1. Gate Valves:

a. Not Used

2. Ductile-Iron Resilient Wedge Gate Valves 4 inches Through 36 inches (AWWA C515):

Valves shall comply with AWWA C515 and the following. Valves shall be of the bolted-bonnet type with nonrising stems. Valve stems shall be Type 304 or 316 stainless steel or cast, forged, or rolled bronze. Provide operating nut for buried valves. Provide handwheel for exposed valves. Stem nuts shall be made of solid bronze. Bronze for internal working parts, including stems, shall not contain more than 2% aluminum nor more than 7% zinc. Bronze shall conform to ASTM B 62 or ASTM B 584 (Alloy C83600), except the stem bronze shall have a minimum tensile strength of 60,000 psi, a minimum yield strength of 30,000 psi, and a minimum of 10% elongation in 2 inches (ASTM B 584 or B 763, Alloy C87600 or C99500). Body bolts shall be 316 stainless steel. End connections for exposed valves shall be flanged. End connections for buried valves shall be mechanical joint or push-on type.

Provide reduction thrust bearings above the stem collar. Stuffing boxes shall be O-ring seal type with two rings located in stem above thrust collar. Each valve shall have a smooth unobstructed waterway free from any sediment pockets.

Valves shall be lined and coated at the place of manufacture with either fusion-bonded epoxy or heat-cured liquid epoxy. Minimum epoxy thickness shall be 8 mils.

Manufacturers: Clow, Mueller, American Flow Control, Waterous, Kennedy, or equal.

3. Butterfly Valves:

a. Thrust Bearings for Butterfly Valves:

Provide thrust bearings to hold the valve disc in the center of the valve seat. No bearings shall be mounted inside the valve body within the waterway. Do not use thrust bearings in which a metal bearing surface on the disc rubs in contact with an opposing metal surface on the inside of the body.

b. Bronze Components in Butterfly Valves:

Bronze components in contact with water shall comply with the following requirements:

Constituent	Content
Zinc	7% maximum
Aluminum	2% maximum
Lead	8% maximum
Copper + Nickel + Silicon	83% minimum

c. Actuator Sizing for Butterfly Valves:

Actuators shall be sized to produce valve shaft output torques equivalent to at least 75% of the torsional shear stress of the minimum required shaft diameters.

d. Port Sizes for Butterfly Valves:

For valves 24 inches and smaller, the actual port diameter shall be at least 93% of the nominal valve size. For valves larger than 24 inches, the port diameter shall not be more than 1.25 inches smaller than the nominal valve size. The dimension of the port diameter shall be the clear waterway diameter plus the thickness of the rubber seat.

e. Corrosion-Resistant Materials in Butterfly Valves:

Where AWWA C504 requires “corrosion resistant” material, such material shall be one of the following:

(1) Bronze as described above.

(2) Type 304 or 316 stainless steel.

(3) Monel (UNS N04400).

(4) Synthetic nonmetallic material.

f. Seating Surfaces in Butterfly Valves:

Seating surfaces shall be stainless steel or nickel-copper per AWWA C504 or nickel-chromium alloy containing a minimum of 72% nickel and a minimum of 14% chromium.

g. Flanged, Rubber-Seated Butterfly Valves 4 Inches and Larger, Class 150B:

Butterfly valves shall be short body, flanged type for exposed valves and valves in vaults or structures, and either flanged or mechanical joint for buried valves. Valve shall conform to AWWA C504, Class 150B. Minimum working differential pressure across the valve disc shall be 150 psi. Flanged ends shall be Class 125, ANSI B16.1. Valve shafts shall be Type 304 or 316 stainless steel. Valve shafts shall be stub shaft or one-piece units extending completely through the valve disc. Materials of construction shall be as follows:

Component	Material	Specification
Body	Cast iron or ductile iron	AWWA C 504
Exposed body capscrews and bolts and nuts	Stainless steel	ASTM A 276, Type 304 or 316
Discs	Cast iron, ductile iron, or Ni-Resist	AWWA C504
Disc fasteners, seat retention segments, and seat fastening devices	Stainless steel	ASTM A 276, Type 304 or 316
Seat material	Buna-N	--

Where the rubber seat is applied to the disc, it shall be bonded to a stainless steel seat retaining ring which is clamped to the disc by Type 304 or 316 stainless steel screw fasteners. The rubber valve seat shall be secured to or retained in the valve body. Valves shall be Pratt, DeZurik Series BAW, M&H, or equal.

4. Pressure Reducing Valves:

a. A water pressure reducing valve with integral strainer shall be installed as shown on the plans, in the locations directed by the Owner, where the supply main pressure exceeds 60 psi to reduce it to 50 psi or lower. The valve shall include a bronze body suitable for water supply pressures up to 400 psi. Provision shall be made to permit the bypass flow of water around the valve back into the main when pressures, due to thermal expansion on the outlet side

of the valve, exceed the pressure in the main. Valves with built-in bypass check valves are acceptable. Valve shall be a Watts Regulator Company Series N35B, or equal.

PART 3 - EXECUTION

A. Joints

1. Bolt holes of flanged valves shall straddle the horizontal and vertical centerlines of the pipe run to which the valves are attached. Clean flanges by wire brushing before installing flanged valves. Clean flange bolts and nuts by wire brushing, lubricate threads with oil and graphite, and tighten nuts uniformly and progressively. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reseat or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight.

2. Clean threaded joints by wire brushing or swabbing. Apply Teflon joint compound or Teflon tape to pipe threads before installing threaded valves. Joints shall be watertight.

B. Installing Buried Valves

1. Connect the valve, coat the flanges, apply tape wrapping or polyethylene encasement, and place and compact the backfill to the height of the valve stem.

2. Place block pads under the extension pipe to maintain the valve box vertical during backfilling and repaving and to prevent the extension pipe from contacting the valve bonnet.

3. Mount the upper slip pipe of the extension in mid position and secure with backfill around the extension pipe. Pour the concrete ring allowing a depression so the valve box cap will be flush with the pavement surface.

4. In streets without concrete curbs and in open areas, install the valve box as for a paved area with concrete curb except include a marker post. Cut the marker post from 4-inch by 4-inch dense structural grade Douglas fir No. 2 surfaced on four sides to a length of 5 feet. Chamfer the top. Set the post in concrete, 2 feet into the ground, away from traffic, and to the side of the pipeline. Coat with a seal and finish coat of white alkyd exterior paint. On the side facing the valve, letter in black the word "VALVE" and the distance in feet from the marker post to the valve box cap.

C. Field Coating Buried Valves

1. Coat flanges of buried valves and the flanges of the adjacent piping, and the bolts and nuts of flanges and mechanical joints, per Section 09900, System No. 24.

D. Installing Extension Stem Guide Brackets

Install at 6- to 8-foot centers. Provide at least two support brackets for stems longer than 10 feet, with one support near the bottom of the stem and one near the top.

E. Mounting Gear Actuators

The valve manufacturer shall select and mount the gear actuator and accessories on each valve and stroke the valve from fully open to fully closed prior to shipment.

F. Field Installation of Gear Actuator

Provide the actuator manufacturer's recommended lubricating oil in each actuator before commencing the field testing.

G. Valve Leakage Testing

Test valves for leakage at the same time that the connecting pipelines are tested. See Section 15144 for pressure testing requirements. Protect or isolate any parts of valves, actuators, or control and instrumentation systems whose pressure rating is less than the pressure test. Valves shall show zero leakage. Repair or replace any leaking valves and retest.

H. Valve Field Testing

1. Operate manual valves through three full cycles of opening and closing. Valves shall operate from full open to full close without sticking or binding. Do not backfill buried valves until after verifying that valves operate from full open to full closed. If valves stick or bind, or do not operate from full open to full closed, repair or replace the valve and repeat the tests.

2. Gear actuators shall operate valves from full open to full close through three cycles without binding or sticking. The pull required to operate handwheel- or chainwheel-operated valves shall not exceed 80 pounds. The torque required to operate valves having 2-inch AWWA nuts shall not exceed 150 ft-lbs. If actuators stick or bind or if pulling forces and torques exceed the values stated previously, repair or replace the actuators and repeat the tests. Operators shall be fully lubricated in accordance with the manufacturer's recommendations prior to operating.

END OF SECTION

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SECTION 15108 AIR-RELEASE AND VACUUM-RELIEF VALVES

PART 1 - GENERAL

A. Description

This section includes materials and installation of combination air-release valves, for water service.

B. Related Work Specified Elsewhere

1. Painting and Coating: 09900.

2. Pressure Testing of Piping: 15144.

C. Submittals

1. Submit shop drawings in accordance with the Special Conditions.

2. Submit manufacturer's catalog data and detail drawings showing all valve parts and describe by material of construction, specification (such as AISI, ASTM, SAE, or CDA), and grade or type. Show linings and coatings.

PART 2 - MATERIALS

A. Valve Design and Operation

1. Valve design shall comply with AWWA C512, except as modified herein. Class 150 valves shall have a maximum working pressure of at least 150 psi. Class 300 valves shall have a maximum working pressure of at least 300 psi. Class 500 valves shall have a maximum working pressure of at least 500 psi.

2. Combination air valves 3 inches and smaller shall have a float with lever arm to actuate a poppet valve. A needle shall be attached to the float arm. The poppet valve shall serve to admit large quantities of air when the pipeline drains. The needle shall serve to release small quantities of air as the pipeline fills or as air accumulates in the pipeline.

B. Materials of Construction

1. Materials of construction for combination air valves for water service shall be as follows:

Item	Material	Specification
Body and cover	Cast iron	ASTM A 48, Class 35; or ASTM A 126, Class B
Float, lever or linkage, air release mechanism, poppet, guide rod, guide bushings, fasteners, other internal metal parts	Stainless steel	AISI Type 316
Plugs	Bronze	See paragraph 5 below
Seat, plunger, needle	Buna-N	--

2. Bronze shall have the following chemical characteristics:

Constituent	Content
Zinc	7% maximum
Aluminum	2% maximum
Lead	8% maximum
Copper + Nickel + Silicon	83% minimum

3. Rubber seats shall be made of a rubber compound that is resistant to free chlorine and monochloramine concentrations up to 10 mg/l in the fluid conveyed.

4. Body and cover bolts, nuts, and capscrews shall be Type 316 stainless steel.

C. Seating

Valves shall seat driptight at a pressure of 1 psi.

D. Valve End Connections

1. Valves 2 inches and smaller shall have threaded ends. Valves 3 inches and larger shall have flanged ends.

2. Flanges for Class 150 valves shall comply with ANSI B16.1, Class 125. Flanges for Class 300 valves shall comply with ANSI B16.1, Class 250.

3. Threaded ends shall comply with ANSI B1.20.1.

E. Valves

1. Combination Air Valves, Single Body, Class 300: Valves shall have a maximum working pressure of 300 psi. Valves shall be APCO series 140C & 150C, Val-Matic series 200C, Crispin UL10, UL20, UL30, UL41, C61 & C81, or approved equal.

PART 3 - EXECUTION

A. Lining and Coating

1. Coat cast-iron valves per Section 09900, System No. 10. Apply the specified prime and finish coats at the place of manufacture.

2. Coat interior surfaces of cast-iron valves at the place of manufacture per Section 09900, System No. 7. Do not coat seating areas and plastic, bronze, stainless steel, or other high alloy parts.

B. Installation

1. Clean flanges by wire brushing before installing flanged valves. Clean flange bolts and nuts by wire brushing, lubricate threads with oil and graphite, and tighten nuts uniformly and progressively. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reseat or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight.

2. Clean threaded joints by wire brushing or swabbing. Apply Teflon joint compound or Teflon tape to pipe threads before installing threaded valves. Joints shall be watertight.

C. Valve Pressure Testing

Test valves at the same time that the connecting pipelines are pressure tested. See Section 15144 for pressure testing requirements. Protect or isolate any parts of valves, operators, or control and instrumentation systems whose pressure rating is less than the test pressure.

D. Air and Vacuum Valve

Construct Air and Vacuum Valve per City of Redlands standard detail A-20515.

END OF SECTION

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SECTION 15122 PIPE COUPLINGS

PART 1 - GENERAL

A. Description

This section includes materials and installation of flexible gasketed sleeve-type compression pipe couplings for steel and ductile iron pipe; and couplings for connecting different pipe materials.

B. Related Work Specified Elsewhere

1. Painting and Coating: 09900.

2. Pressure Testing of Piping: 15144.

C. Submittals

1. Submit shop drawings in accordance with Section 01330.

2. Submit manufacturer's catalog data on flexible pipe couplings. Show manufacturer's model or figure number for each type of coupling or joint for each type of pipe material for which couplings are used. Show coatings.

3. Submit manufacturer's recommended torques to which the coupling bolts shall be tightened for the flexible gasketed sleeve-type compression pipe couplings.

4. Show materials of construction by ASTM reference and grade. Show dimensions.

5. Show number, size, and material of construction of tie rods and lugs for each thrust harness on the project.

PART 2 - MATERIALS

A. Coupling System Design and Component Unit Responsibility

Gaskets, bolts, nuts, glands, end rings, and hardware for pipe couplings of all types shall be furnished by the manufacturer of the pipe coupling and shall be designed as an integral system by the pipe coupling manufacturer. Gaskets shall be designed for the coupling and appropriately sized to provide a watertight seal at the design pressure and temperature. Gaskets, bolts, nuts, glands, end rings, and hardware for pipe couplings shall be shipped with the pipe coupling and shall be clearly labeled indicating the origin of the material, including place and date of manufacture. Manufacturer's printed installation instructions shall be packaged with each pipe coupling.

B. Steel Flexible Pipe Couplings

1. Steel couplings shall have center sleeves and end rings made of carbon Type 304 stainless steel conforming to AWWA C219, Section 4. Minimum center sleeve length shall be 5 inches for pipe sizes 3/4 inch through 4-1/2 inches, 7 inches for pipe sizes 5 inches through 24 inches, and 10 inches for pipe sizes larger than 24 inches.

2. Sleeve bolts shall be ASTM A307 Grade A per AWWA C219, Section 4.

3. Steel end rings shall be cast, forged, or hot rolled in one piece. Do not use rings fabricated from two or more shapes.

4. Wall thickness of sleeve shall be at least that specified for the size of pipe in which the coupling is to be used.

C. Ductile-Iron Flexible Pipe Couplings

1. Couplings shall have center sleeves and end rings made of ductile iron conforming to AWWA C219, Section 4.

2. Sleeve bolts ASTM A307 Grade A per AWWA C219, Section 4.

D. Flexible Pipe Couplings for Plain-End Steel Pipe

Couplings shall be steel, Dresser Style 38, Smith-Blair Type 411, Romac Style 501, or equal.

E. Flexible Pipe Couplings for Plain-End Ductile-Iron Pipe

1. Couplings for pipe 12 inches and smaller shall be cast iron, Dresser Style 153, Smith-Blair Type 441, Romac Style 501, or equal.

2. Couplings for pipe larger than 12 inches shall be cast iron or steel, Dresser Style 38 or 153, Smith-Blair Style 411, Romac Style 501, or equal.

F. Restrained Pipe Couplings for Plain-End Ductile-Iron and PVC Pipe

Couplings shall be a ductile iron mechanical joint solid sleeve by Tyler Union or approved equal with restrained joints per Section 15240.

G. Transition Couplings

Couplings for connecting different pipes having different outside diameters shall be steel: Dresser Style 62 or 162, Smith-Blair Series 413, Romac Style 501, or equal. Couplings shall have an internal full circumference ring pipe stop at the midpoint of the coupling. ID of coupling pipe stop shall equal ID of smaller diameter pipe.

H. Flanged Coupling Adapters for Steel Pipe

Adapters for steel pipe shall be steel: Dresser Style 128, Smith-Blair Type 913, or equal. Flange ends shall match the flange of the connecting pipe; see detail piping specifications.

I. Flanged Coupling Adapters for Cast- and Ductile-Iron Pipe

1. Adapters for cast- and ductile-iron pipe 12 inches and smaller shall be cast iron: Dresser Style 127, Smith-Blair Series 912, or equal.

2. Adapters for cast- and ductile-iron pipe larger than 12 inches shall be steel: Dresser Style 128, Smith-Blair Type 913, or equal.

3. Flange ends shall match the flange of the connecting pipe; see detail piping specifications.

PART 3 - EXECUTION

A. Installation of Flexible Pipe Couplings

1. Clean oil, scale, rust, and dirt from pipe ends. Clean gaskets in flexible pipe couplings before installing.

2. Lubricate bolt threads with graphite and oil prior to installation.

B. Painting and Coating

1. Coat buried flexible pipe couplings (including joint harness assemblies), transition couplings, segmented sleeve couplings, and flanged coupling adapters per Section 09900, System No. 21. Coat buried bolt threads, tie bolt threads, and nuts per Section 09900, System No. 24. Then wrap the couplings with cold-applied wax tape per Section 09952 and with polyethylene wrap per Section 09954.

2. Line flexible pipe couplings and segmented sleeve couplings with epoxy per Section 09900, System No. 7.

C. Hydrostatic Testing

Hydrostatically test flexible pipe couplings, expansion joints, segmented sleeve couplings, and expansion compensators in place with the pipe being tested. Test in accordance with Section 15144.

END OF SECTION

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SECTION 15123 CORPORATION STOPS AND SERVICE SADDLES

PART 1 - GENERAL

A. Description

This section includes materials and installation of service saddles and corporation stops. Note that per California Senate Bill AB 1953, all service brass (except service saddles) installed in any public water system starting January 1, 2010, shall contain no more than 0.25% lead by weight.

B. Related Work Specified Elsewhere

1. Painting and Coating: 09900.

2. Pressure Testing of Piping: 15144.

3. AWWA C800

C. Submittals

1. Submit shop drawings in accordance with the Special Conditions.

2. Submit manufacturer's catalog data and descriptive literature showing dimensions and materials of construction by ASTM reference and grade. Show coatings.

PART 2 - MATERIALS

A. Corporation Stops

Corporation stops shall be bronze (ASTM B 62). All corporation stops shall be manufactured and tested in accordance with AWWA C800, latest revision.

Corporation stops shall be Jones J-1937, or approved equal, for 3/4" up to 2”.

B. Service Saddles for Ductile-Iron, and PVC (AWWA C900 and C909) Pipe

1. Type 1 service saddles shall be of the double-strap type. Bodies shall be malleable iron (ASTM A 47 or A 197). Straps shall be forged steel (ASTM A 105, A 181, or A 182). Tap sizes on the outlet shall be 3/4 inch through 2 inches to accommodate the connecting piping or corporation stops. Service saddles shall be Dresser Style 91, Rockwell Type 313, or equal.

2. Type 2 service saddles shall be of the double-strap type. Straps and bodies shall be bronze or silicon bronze. Tap sizes on the outlet shall be 3/4 inch through 2 inches

to accommodate the connecting piping or corporation stops. Service saddles shall be James Jones J-979 (for ductile-iron and AC pipe), J-969 (for PVC pipe), Mueller, or equal.

3. Use Type 2 saddles unless plans direct otherwise.

C. Service Saddles for Schedule 40 and 80 PVC Pipe

Service saddles shall be malleable iron (ASTM A 47 or A 197) or bronze (ASTM B 61 or B 62), using interlocking lugs and a single bolt to hold the saddle in place. Tap sizes on the outlet shall be 3/4 inch or 1 inch to accommodate the connecting piping or corporation stops. Service saddles shall be Dresser Style 194, Rockwell Models 395 or 397, or equal.

D. Service Saddles with Grooved-End Outlet for Steel Pipe

Service saddles with grooved-end outlets for use on steel pipe having outside diameters conforming to ANSI B36.10 shall have malleable iron (ASTM A 47 or A 197) or ductile-iron (ASTM A 536) bodies. Gasket shall conform to ASTM D 2000. Bolts shall conform ASTM A 193, Grade B8, Class 2. Provide a locating collar in the upper housing to engage the tapped outlet hole in the pipe and provide a rigid, nonrotating position. Working pressure shall be at least 300 psi. Outlets shall be grooved end, conforming to AWWA C606, Table 3. Service saddles shall be Victaulic Style 920 or equal.

PART 3 - EXECUTION

A. Installation of Service Saddles

Install service saddles with the gaskets seated on the pipe so that zero leakage is obtained. Tighten bolts to the torque recommended by the manufacturer.

B. Painting and Coating of Service Saddles

1. Coat service saddles located above ground or in vaults and structures the same as the piping to which they are attached. Apply prime coat at factory. Color of finish coat shall match the color of the pipe to which the service saddle is connected.

END OF SECTION

SECTION 15141 DISINFECTION OF PIPING

PART 1 - GENERAL

A. Description

This section describes requirements for disinfection by chlorination of potable and recycled water mains, services, pipe appurtenances and connections.

B. Referenced Standards

The publications listed below form part of this specification to the extent referenced and are referred to in the text by the basic designation only. Reference shall be made to the latest edition of said standards unless otherwise called for.

AWWA B300 - Standard for Hypochlorites
AWWA B301 - Standard for Liquid Chlorine
AWWA C651 - Disinfecting Water Mains

C. Related Work Specified Elsewhere

AWWA Standard Methods for the Examination of Water and Wastewater
WAS Standard Specifications 15000, 15044, 15056, 15057, 15061, and 15064

D. Service Application

1. All water mains and appurtenances taken out of service for inspection, repairs, or other activity that might lead to contamination shall be disinfected before they are returned to service.

2. All new water mains and temporary pipelines shall be disinfected prior to connection to the City of Redlands existing system.

3. All components incorporated into a connection to the City of Redlands existing system shall be disinfected prior to installation.

E. Submittals

1. A written disinfection and dechlorination plan, including all methods and equipment to be used, shall be signed by the person responsible for performing the work and shall be submitted to the City for approval prior to starting disinfection operations.

F. Delivery, Storage and Handling

1. Chlorination and dechlorination shall be performed by competent individuals knowledgeable and experienced in the operation of the necessary application and safety equipment in accordance with applicable Federal, State and Local laws and regulations. The transport, storage and handling of these materials shall be performed in accordance with Code of Federal Regulations (CFR) 1910.120 Hazardous Waste Operations and Emergency Response, CFR 49.172 Hazardous Materials Regulations, and the General Industry Safety Orders of the California Code of Regulations, Title 8, Section 5194.

G. Concurrent Disinfection and Hydrostatic Testing

1. The specified disinfection of the pipelines may not be performed concurrently with the hydrostatic testing in accordance with Section 15144.

H. Connection To Existing Mains

1. Prior to connection to existing mains, disinfection and bacteriological testing shall be performed in accordance with this specification.

2. City of Redlands authorization for connection to the existing system shall be given only on the basis of acceptable hydrostatic, disinfection and bacteriological test results.

PART 2 - MATERIALS

A. Liquid Chlorine (Gas)

1. Liquid chlorine contains 100-percent available chlorine and is packaged in steel containers in net weights of 68.1kg (150 lb.) or 907.2kg (1 ton).

2. Liquid chlorine shall be used with appropriate gas flow chlorinators, heaters, and injectors to provide a controlled, high-concentration solution feed to the water. The chlorinators and injectors shall be the vacuum-operated type.

I. Sodium Hypochlorite (Liquid)

1. Sodium hypochlorite is available in liquid form in glass or plastic containers, ranging in size from 0.95 L (1 Qt.) to 18.93 L (5 Gal). The solution contains approximately 10% to 15% available chlorine.

J. Tablet Or Granular Hypochlorite

1. Tablet or granular hypochlorite shall not be used at any time.

PART 3 - EXECUTION

A. General

1. Any planned disinfection activities for a given week may not occur past 12:00 PM on Thursday unless otherwise authorized by the City representative. The City may adjust this requirement for holidays or special conditions as needed.

2. Disinfection of pipelines shall not proceed until all appurtenances and any necessary sample ports have been installed and the City of Redlands Water Quality Control Officer provides authorization.

3. Every effort shall be made to keep the water main and its appurtenances clean and dry during the installation process.

4. All piping, valves, fittings, and appurtenances which become contaminated during installation shall be cleaned, rinsed with potable water, and then sprayed or swabbed with a 5 percent sodium hypochlorite disinfecting solution prior to installation.

5. Water mains under construction that become flooded by storm water, runoff, or ground water shall be cleaned by draining and flushing with metered potable water until clear water is evident. Upon completion, the entire main shall be disinfected using a method approved by the City of Redlands Water Quality Control Officer.

6. City of Redlands Water Quality Control Officer shall be present at the time of disinfection and must be given at least 48 hours notice of the activity.

B. Methods

1. Liquid Chorine (Gas)

   a. Only vacuum-operated equipment shall be used. Direct-feed chlorinators, which operate solely from gas pressure in the chlorine cylinder, shall not be permitted. The equipment shall incorporate a backflow prevention device at the point of connection to the potable water source used to fill the line being tested.

   b. The chlorinating agent shall be applied at the beginning of the system to be chlorinated and shall be injected through a corporation stop, a hydrant, or other approved connection to ensure treatment of the entire system being disinfected.

   c. Only a certified, licensed chlorination and testing contractor shall perform gas chlorination work. The chlorination contractor must also possess a Grade II Treatment Plant Operator Certification from the State of California if required by The City of Redlands Engineer.

2. Sodium Hypochlorite Solution (Liquid)

a. Sodium hypochlorite solution shall be used for cleaning and swabbing piping and appurtenances immediately prior to installation and for disinfecting all components of connections to the City of Redlands existing system.

b. Sodium hypochlorite solution may be used for the initial disinfection of newly installed water mains. The solution shall be applied at a terminus of the system to be chlorinated using an injector which can adjust the amount of solution being injected into the piping system. The solution shall be injected in the appropriate concentration to achieve the specified concentration range of chlorine throughout the entire piping system. Where pumping equipment is used in conjunction with an injector, an integral backflow prevention device shall be installed and connected to the potable water supply.

c. Water trucks, pumping equipment, piping, appurtenances and all other disinfection equipment in contact with potable water shall be disinfected prior to use.

d. Sodium hypochlorite solution may also be used to increase the total chlorine residual if the concentration from the initial chlorination of the system is found to be low.

e. The solution shall be added to the system in sufficient amounts at appropriate locations to ensure that the disinfecting solution is present at a concentration within the specified range throughout the piping system.

C. Procedure For Disinfecting Water Mains and Appurtenances

1. The pipeline shall be filled at a rate not to exceed 1,135 liters per minute (300 GPM) or a velocity of 0.3m per second (1 foot per second), whichever is less.

2. Disinfection shall result in an initial total chlorine concentration of 100-mg/l. Not to exceed 110-mg/l or less than 90-mg/l. This concentration shall be evenly distributed throughout the system to be disinfected.

3. All valves shall be operated with the disinfection solution present in the pipeline. All appurtenances such as air-vacuum relief valves, blowoffs, hydrants, backflow prevention devices, and water service laterals shall be flushed with the treated water a sufficient length of time to insure a chlorine concentration within the specified range in all components of each appurtenance. (Note the limitations for discharge of chlorinated water outlined below.)

4. The City of Redlands Water Quality Control Officer will verify the presence of the disinfection solution throughout the system by sampling and testing for acceptable chlorine concentrations at the various appurtenances and/or at the test ports provided by the Contractor. Areas of the system found to be below the specified chlorine concentration level shall receive additional flushing as noted above and/or additional disinfection solution as necessary. (Note the limitations for discharge of chlorinated water outlined below.) Addition of disinfection solution after the initial

charging of the line shall be made by either the liquid chlorine (gas) method, or the sodium hypochlorite method as directed by the City of Redlands Water Quality Control Officer.

5. The chlorinated water shall be retained in the system for a minimum of 24 hours, except when disinfecting steel cement mortar lined and coated pipelines, which require a retention time of 4 hours.

6. The City of Redlands Water Quality Control Officer will test the total chlorine residual. The system shall contain a total chlorine residual of not less than 80% of the initial total chlorine residual before the soaking period began. If the total chlorine residual has decreased more than 20%, the system shall be flushed in accordance with the procedure detailed herein and shall be re-disinfected.

7. Following a successful retention period as determined by the City of Redlands Water Quality Control Officer, the chlorinated water shall be flushed from the system at its extremities and at each appurtenance, using potable water from a source designated by the City of Redlands Water Quality Control Officer.

   The minimum water velocity during flushing shall be 0.9 meters per second (3 feet per second) or as directed by the City of Redlands Water Quality Control Officer. Flushing shall continue until the replacement water in the new system is equal in chlorine residual to the potable source of supply and the turbidity level is 0.5 NTU's or less as verified by the City of Redlands. (Note the limitations for discharge of chlorinated water are outlined below.)

8. The City of Redlands Water Quality Control Officer will perform bacteriological sampling and testing as specified herein.

D. Discharge of Chlorinated Water

1. Indiscriminate onsite disposal or discharge to sewer systems, storm drains, drainage courses or surface waters is prohibited. It shall be the responsibility of the Contractor to file a Notice of Intent and obtain a General Waste Discharge Requirement Permit for Discharges of Hydrostatic Test Water and Potable Water to Surface Waters, Storm Drains or Other Conveyance Systems, for any discharge. The Contractor shall be solely responsible including any monitoring and reporting as required. The Contractor shall comply with all requirements of the State Water Resources Control Board and the San Bernardino County Regional Water Quality Control Board. The Contractor shall provide copies of all reports and monitoring information including time and place of discharge to the City of Redlands.

   Failure to comply with these provisions is a violation of federal and state law. The Contractor hereby agrees to indemnify and hold harmless the City of Redlands, its Counsel members, officers, agents, employees and authorized volunteers from and against any and all claims, demands, losses or liabilities of any kind or nature which City of Redlands, its counsel members, officers, agents, employees and authorized

volunteers may sustain or incur for noncompliance arising out of or in connection with the Project.

2. The environment to which the chlorinated water is to be discharged shall be examined by the Developer and the City of Redlands Inspector. Where necessary, federal, state and local regulatory agencies should be contacted to determine special provisions for the disposal of chlorinated water. Chlorinated water cannot be discharged into any storm drain.

3. Chlorine neutralization is required in all locations a reducing agent shall be applied to the water as it exits the piping system. The Developer shall monitor the chlorine residual at piping effluent during the discharge operations.

   The various methods of dechlorination available can remove residual chlorine to concentrations below standard analytical methods of detection, 0. 1 mg/l, with a neutral pH, which will assure compliance with the effluent limit. The Contractor will perform all necessary tests to ensure that the total residual chlorine effluent limitations are met and signed certified copies of all test results are submitted to the City of Redlands.

4. In locations where no hazard to the environment is evident based on the joint examination described above, the chlorinated water may be broadcast for dust control on the surface of the immediate site. Care shall be exercised in broadcasting the water to prevent runoff.

E. Bacteriological Testing

The City of Redlands will perform bacteriological sampling and testing of all new system installations. The testing methodology employed by the City of Redlands shall be as set forth in "Standard Methods for the Examination of Water and Wastewater" (current edition). Testing requirements are as set forth in the California Domestic Water Quality and Monitoring Regulations and commensurate with current requirements for surface water testing. The City of Redlands will analyze the samples for the presence of coliform bacteria and heterotrophic-type bacteria (heterotrophic plate count). The evaluation criteria employed by the City of Redlands for a passing test sample is as follows:

1. Coliform: Absent sample, or

2. Heterotrophic plate count (HPC): 500 colony forming units/ml or less.
   (The requirement for HPC testing may be waived at the sole discretion of the Water Quality Control Officer.)

F. Redisinfection

If the initial disinfection fails to produce satisfactory bacteriological test results, the pipeline system shall be re-flushed and re-sampled. If the second set of samples does not produce satisfactory results, the pipeline system shall be re-chlorinated, flushed, and re-sampled. The

chlorination, flushing, and sampling procedure shall continue until satisfactory results are obtained. Redisinfection and retesting shall be at the Contractor's expense.

G. Disinfecting Tie-Ins and Connections

Pipes, fittings, valves and all other components incorporated into connections with the City of Redlands existing system shall be spray disinfected or swabbed with a liquid chlorine solution in accordance with AWWA C651 and as specified herein. Upon connection to the main, the line shall be flushed as directed by the City of Redlands Water Quality Control Officer. Disinfection by this method is generally limited to assemblies of 6m (20') or less in length. Alternate methods such as "predisinfection" prior to installation in accordance with AWWA C651 may be required at the discretion of the City of Redlands Water Quality Control Officer.

END OF SECTION

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SECTION 15144 PRESSURE TESTING OF PIPING

PART 1 - GENERAL

A. Description

This section specifies the hydrostatic, and leakage testing of pressure piping for water distribution and transmission mains.

B. Related Work Specified Elsewhere

1. Disinfection of Piping: 15141.

C. Submittals

1. Submit shop drawings in accordance with the General Requirements.

2. Submit test bulkhead locations and design calculations, pipe attachment details, and methods to prevent excessive pipe wall stresses.

3. Submit five copies of the test records to the Owner's Representative upon completion of the testing.

D. Test Pressures

Test pressures for the various services and types of piping are shown in Subsection 3.K.

E. Testing Records

Provide records of each piping installation during the testing. These records shall include:

1. Date and times of test.

2. Identification of pipeline, or pipeline section tested or retested.

3. Identification of pipeline material.

4. Identification of pipe specification.

5. Test fluid.

6. Test pressure at low point in pipeline, or pipeline section.

7. Remarks: Leaks identified (type and location), types of repairs, or corrections made.

8. Certification by Contractor that the leakage rate measured conformed to the specifications.

PART 2 - MATERIALS

A. Manual Air-Release Valves for Buried Piping

Provide temporary manual air-release valves at test bulkheads for pipeline test. Construct the pipe outlet in the same manner as for a permanent air valve and after use, seal with a blind flange, pipe cap, or plug and coat the same as the adjacent pipe.

B. Test Bulkheads

Design and fabricate test bulkheads per Section VIII of the ASME Boiler and Pressure Vessel Code. Materials shall comply with Part UCS of said code. Design pressure shall be at least 2.0 times the specified test pressure for the section of pipe containing the bulkhead. Limit stresses to 70% of yield strength of the bulkhead material at the bulkhead design pressure. Include air-release and water drainage connections.

C. Testing Fluid

1. Testing fluid shall be water.

2. For potable water pipelines, obtain and use only potable water for hydrostatic testing.

3. Submit request for use of water from waterlines of Owner 48 hours in advance.

4. The Contractor may obtain the water from the Owner. See the General Conditions, Section 7-8.5 for more information.

D. Testing Equipment

Provide calibrated pressure gauges, pipes, bulkheads, pumps, chart recorder, and meters to perform the hydrostatic testing.

PART 3 - EXECUTION

A. Testing Preparation

1. Pipes shall be in place, backfilled, and anchored before commencing pressure testing.

2. For buried piping, the pipe may be partially backfilled and the joints left exposed for inspection during an initial leakage test. Perform the final pressure test, however, after completely backfilling and compacting the trench.

3. Provide any temporary piping needed to carry the test fluid to the piping that is to be tested. After the test has been completed and demonstrated to comply with the

specifications, disconnect and remove temporary piping. Do not remove exposed vent and drain valves at the high and low points in the tested piping; remove any temporary buried valves and cap the associated outlets. Plug taps or connections to the existing piping from which the test fluid was obtained.

4. Provide temporary drain lines needed to carry testing fluid away from the pipe being tested. Remove such temporary drain lines after completing the pressure testing. Drain the pipes after they have been tested.

5. Prior to starting the test, the Contractor shall notify the Owner's Representative.

6. All appurtenances must be installed on the pipeline prior to pressure testing, service laterals shall be tested to the angle meter stop.

B. Cleaning

1. Before conducting hydrostatic tests, flush pipes with water to remove dirt and debris. Maintain a flushing velocity of at least 3 fps for water testing. Flush pipes for time period as given by the formula

$$T = \frac{2L}{3}$$

in which:

T = flushing time (seconds)

L = pipe length (feet).

C. Testing and Disinfection Sequence for Potable Water Piping

1. Perform required disinfection after hydrostatic testing, except when pipeline being tested is connected to a potable waterline.

2. Locate and install test bulkheads, valves, connections to existing pipelines, and other appurtenances in a manner to provide an air gap separation between existing potable water pipelines and the pipeline being tested. Disinfect water and pipeline being tested before hydrostatic testing when connected to a potable waterline.

D. Length of Test Section for Buried Piping

The maximum length of test section for buried pipe of 12 inches or smaller in diameter is 3,500 feet; for buried pipe larger than 12 inches, 1 mile. Provide intermediate test bulkheads where the pipeline length exceeds these limits.

E. Initial Pipeline Filling for Hydrostatic Testing

Maximum rate of filling shall not cause water velocity in pipeline to exceed 1 fps. Filling may be facilitated by removing automatic air valves and releasing air manually.

F. Testing New Pipe Which Connects to Existing Pipe

Prior to testing new pipelines which are to be connected to existing pipelines, isolate the new line from the existing line by means of test bulkheads, spectacle flanges, or blind flanges. After the new line has been successfully tested, remove test bulkheads or flanges and connect to the existing piping.

All bulkheads, flanges and the extents of testing shall be included in the Connection Submittal as described in Section 01110 of the General Requirements.

G. Hydrostatic Testing of Aboveground or Exposed Piping

1. Open vents at high points of the piping system to purge air while the pipe is being filled with water. Venting during system filling may also be provided by temporarily loosening flanges.
2. Subject the piping system to the test pressure indicated. Maintain the test pressure for a minimum of two (2) hours or for as long as required for proper inspection of the joint. Examine joints, fittings, valves, and connections for leaks. The piping system shall show zero leakage or weeping. Correct leaks and retest until zero leakage is obtained.

H. Hydrostatic Testing of Buried Piping

1. Where any section of the piping contains concrete thrust blocks or encasement, do not make the pressure test until at least 10 days after the concrete has been placed. When testing mortar-lined or PVC piping, fill the pipe to be tested with water and allow it to soak for at least 24 hours to absorb water before conducting the pressure test.

2. Apply and maintain the test pressure by means of a positive displacement hydraulic force pump.

3. Maintain the test pressure for not less than two (2) hours, and for as much longer as necessary for proper inspection of the joint, by restoring it whenever it drops an amount of 5 psi.

4. After the test pressure is reached, use a meter to measure the additional water added to maintain the pressure. This amount of water is the loss due to leakage in the piping system. The allowable leakage volume is defined by the formula:

$$L = \frac{HND(P)^{1/2}}{C}$$

in which:

L = allowable leakage (gallons)
H = specified test period (hours)
N = number of rubber-gasketed joints in the pipe tested
D = diameter of the pipe (inches)
P = specified test pressure (psig)
C = 7,400

5. The allowable leakage for buried piping having threaded, brazed, or welded (including solvent welded) joints shall be zero.

6. Repair and retest any pipes showing leakage rates greater than that allowed in the above criteria.

I. Repetition of Test

If the actual leakage exceeds the allowable, locate and correct the faulty work and repeat the test. Restore the work and all damage resulting from the leak and its repair. Eliminate visible leakage.

J. Bulkhead and Test Facility Removal

After a satisfactory test, remove the testing fluid, remove test bulkheads and other test facilities, and restore the pipe coatings.

K. Test Pressure

1. Testing pressure (psig) shall be 225 or as specified on the drawings.

END OF SECTION

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SECTION 15240 DUCTILE-IRON PIPE

PART 1 - GENERAL

A. Description

This section describes materials, testing, and installation of ductile-iron pipe and fittings 30 inches and smaller.

B. Related Work Specified Elsewhere

1. Trenching, Backfilling, and Compacting: SSPWC Sections 200, 300, and 306
2. Painting and Coating: 09900.
3. General Piping Requirements: 15050.
4. Flexible Pipe Couplings and Expansion Joints: 15122.
5. Corporation Stops and Service Saddles: 15123.
6. Disinfection of Piping and Structures: 15141.
7. Pressure Testing of Piping: 15144.

C. Submittals

1. Submit shop drawings in accordance with the Special Conditions.
2. Provide an affidavit of compliance with standards referenced in this specification, e.g., AWWA C151. Submit copy of report of pressure tests for qualifying the designs of all sizes and types of AWWA C153 fittings that are being used in the project. The pressure test shall demonstrate that the minimum safety factor described in AWWA C153, Section 5.5 is met.
3. Provide the following information:
    a. Mortar lining thickness.
    b. Wall thickness.
    c. Show deflections at push-on and mechanical joints.
    d. Submit joint and fitting details and manufacturer’s data sheets.
4. Submit calculations and test data proving that the proposed restrained joint arrangement can transmit the required forces with a minimum safety factor of 1.5.

5. Submit certificate that cement for mortar lining complies with ASTM C 150, designating type.

6. Submit test report on physical properties of rubber compound used in the gaskets.

7. Submit drawing or manufacturer's data sheet showing flange facing, including design of facing serrations.

D. Measurement and Payment

See Section 01200.

PART 2 - MATERIALS

A. Pipe

Pipe shall be cast ductile (nodular) iron, conforming to AWWA C151. Provide pipe in nominal 18- or 20-foot laying lengths.

B. Pipe Marking

Plainly mark each length of straight pipe and each fitting at the bell end to identify the design pressure class, the ductile-iron wall thickness, and the date of manufacture. Mark the spigot end of restrained joint pipe to show clearly the required depth of insertion into the bell.

C. Design Criteria

1. Obtain the following information from the contract documents:

   a. Elevation of the pipe invert and of the completed ground.

   b. Alignment of the pipeline.

   c. Field test hydraulic gradient elevation (HGL).

   d. Nominal internal diameter, ID.

   e. Design internal pressure class.

   f. Joint types(s).

D. Pipe Wall Thickness

1. Minimum wall thicknesses for pipe having grooved-end joints shall be as shown in the following table:

Pipe and Fitting Sizes (inches)	Wall Thickness*
16 and smaller	Special Class 53
18	Special Class 54
20	Special Class 55
24 to 36	Special Class 56
*Special Class and Pressure Class per AWWA C151.	

2. Minimum wall thickness for pipe having push-on or mechanical joints, restrained joints, plain ends, or cast flange ends shall be Class 150, unless otherwise shown in the drawings.

3. Minimum wall thickness for pipe having threaded flanges shall be Special Class 53.

4. Minimum pipe wall thickness required for corporation stops and tapped outlets shall be in accordance with Table A.1 of AWWA C151 for three full threads for design pressures up to 250 psi and four full threads for design pressures over 250 to 350 psi.

E. Fittings

1. Fittings 48 inches and smaller shall conform to AWWA C110 with a minimum pressure rating of 250 psi. Material shall be ductile iron. Flanges shall be flat faced.

2. Mechanical joint fittings conforming to AWWA C153 may be used in lieu of AWWA C110 fittings.

3. Grooved-end fittings shall conform to AWWA C110 with grooved ends conforming to AWWA C606, radius cut rigid joints. Fitting material shall conform to ASTM A 48, Class 30; ASTM A 126, Class B; or ASTM A 536, Grade 65-42-10. Wall thickness of ductile-iron (ASTM A 536) fittings shall conform to AWWA C110 or C153; wall thickness of cast-iron fittings shall conform to AWWA C110. Fittings and couplings shall be furnished by the same manufacturer.

4. Material for fittings with welded-on bosses shall have a Charpy notch impact value of minimum 10 ft-lbs under the conditions defined in AWWA C151. Test completed welds by the liquid penetrant method per ASTM E 165.

F. Flanges

1. Flanges shall be solid back, Class 125 per AWWA C115. Flanges on pipe shall be either cast or threaded. Material shall be ductile iron.

2. Flanged pipe and fittings shall be shop fabricated, not field fabricated. Threaded flanges shall comply with AWWA C115. Flanges shall be individually fitted and machine tightened in the shop, then machined flat and perpendicular to the pipe

barrel. Flanges shall be backfaced parallel to the face of flange. Prior to assembly of the flange onto the pipe, apply a thread compound to the threads to provide a leak-free connection. There shall be zero leakage through the threads at a hydrostatic test pressure of 250 psi without the use of the gasket.

G. Pipe Lining--Cement Mortar

1. Line pipe interior and fittings with cement-mortar per AWWA C104. Lining thickness shall be the single thickness listed in AWWA C104, Section 4.7. Lining material shall conform to ASTM C 150, Type II.

2. Line blind flanges per Section 09900, System No. 7.

3. Loose areas of cement-mortar lining are not acceptable. Remove and reconstruct lining in areas where quality is defective, such as sand pockets, voids over sanded areas, blisters, drummy areas, cracked areas, and thin spots. Longitudinal cracks in excess of 1/32 inch in width or where crack extends to metal shall be repaired. Repair all cracks larger than 1/16 inch per AWWA C104.

H. Grooved-End Couplings

1. Grooved-end pipe couplings shall be ductile iron, ASTM A 536 (Grade 65-45-12). Gaskets shall be halogenated butyl rubber or EPDM and shall conform to ASTM D 2000.

2. Bolts in exposed service shall conform to ASTM A 193, Grade B8, Class 2. Bolts in buried or submerged service shall be ASTM A 193, Grade B8, Class 2.

3. Couplings for pipe 24 inches and smaller shall conform to AWWA C606 for flexible radius ductile-iron pipe, except where rigid radius couplings are required to connect to fittings. Couplings for pipe sizes 30 and 36 inches shall be in accordance with the coupling manufacturer's published literature for tolerances and dimensions for flexible and rigid radius cut joints. Couplings shall be Victaulic Style 31, Gustin-Bacon No. 500, or equal.

4. Couplings for pipe larger than 36 inches shall conform to AWWA C606 for shouldered end pipe. Couplings shall be Victaulic Style 44 or equal.

5. Grooved-end adapter flanges for piping 24 inches and smaller having an operating pressure of 150 psi and less shall be Victaulic Style 341 or 342 or equal. Flange dimensions shall conform to ANSI B16.1, Class 125.

6. Grooved-end transition couplings for connecting ductile-iron pipe 12 inches and smaller to steel pipe shall be Victaulic Style 307 or equal.

I. Gaskets for Flanges

See Section 15050.

J. Gaskets for Mechanical, Push-On, and Restrained Joints

Synthetic rubber in accordance with AWWA C111.

K. Bolts and Nuts for Flanges

See Section 15050.

L. Outlets and Nozzles

1. Provide outlets 2 inches and smaller by tapping the pipe and attaching a service clamp as specified in Section 15123 or use a threaded welded-on boss. Use Type 2 clamps for exposed piping. Use Type 2 clamps for buried and submerged piping.

2. For outlets larger than 2 inches, use a tee with a flanged outlet.

M. Joints

1. Joints in aboveground or submerged piping or piping located in vaults and structures shall be grooved end or flanged.

2. Joints in buried piping shall be of the push-on type per AWWA C111 except where flanged joints are required to connect to valves, meters, and other equipment. Provide unrestrained buried joints except where restrained joints are specifically shown in the drawings.

3. Restrained joints for piping 6 inches and larger shall be American Cast Iron Pipe "Lok-Ring" or "Flex-Ring," U.S. Pipe "TR-Flex," or equal. Field Lok 350 Gasket or approved equal and mechanical joint restraints as called out in Section 15240 Part 2.N may be used in lieu of restrained pipe joints.

4. Where thrust restraint is called for in the drawings, provide pipe with restrained joints capable of transmitting 1.5 times the thrust, as calculated by the following equation:

$$T = 1.5 * (0.785 * P * D^2)$$

where:

P = Pressure class of pipe in psi.
D = Outside diameter of pipe in inches.
T = Thrust in pounds.

N. Mechanical Joint Restraint System Using Follower Ring and Wedges

The restraining mechanism shall consist of a follower gland having a seal gasket and individually actuated wedges that increase their resistance to pullout as pressure or external forces increase. The system manufacturer shall provide all the components (follower ring, wedges, and gaskets) for the restraining device. The device shall be

capable of full mechanical joint deflection during assembly, and the flexibility of the joint shall be maintained after burial. The joint restraint ring and its wedging components shall be constructed of ductile iron conforming to ASTM A 536, Grade 60-42-10. The wedges shall be ductile iron, heat-treated to a minimum hardness of 370 BHN. Dimensions of the gland shall be such that it can be used with mechanical joint bells conforming to AWWA C111 and AWWA C153. The design shall use torque limiting twist-off nuts to provide actuation of the restraining wedges. The mechanical joint restraint shall be available in the size range of 3 through 48 inches. Minimum rated pressure shall be 350 psi for sizes 16 inches and smaller and 250 psi in sizes 18 inches and larger. Products: Megalug Series 1100 as manufactured by EBAA Iron, Inc., or equal.

O. Ductile-Iron Pipe Weldments

1. All welding to ductile-iron pipe, such as for bosses and joint restraint shall be done at the place of manufacture of the pipe. Perform welding by skilled welders experienced in the method and materials to be used.

PART 3 - EXECUTION

A. Delivery, Unloading, and Temporary Storage of Pipe at Site

1. Use unloading and installation procedures that avoid cracking of the lining.

2. Deliver the pipe alongside the pipe laying access road over which the pipe trailer-tractors can travel under their own power. Place the pipe in the order in which it is to be installed and secure it from rolling.

3. Do not move pipe by inserting any devices or pieces of equipment into the pipe barrel. Field repair linings damaged by unloading or installation procedures.

B. Sanitation of Pipe Interior

1. During laying operations, do not place tools, clothing, or other materials in the pipe.

2. When pipelaying is not in progress, close the ends of the installed pipe by a child- and vermin-proof plug.

C. Installing Flanged Pipe and Fittings

Install in accordance with SSPWC Section 306 and as follows. Cut the bore of the gaskets such that the gaskets do not protrude into the pipe when the flange bolts are tightened.

D. Installing Grooved-End Pipe and Fittings

See Section 15050.

E. Installing Buried Piping

1. Install in accordance with Section 02223 and as follows.

2. When installing piping in trenches, do not deviate more than 1 inch from line or 1/4 inch from grade. Measure for grade at the pipe invert.

3. Provide thrust blocks at fittings per Drawings.

4. Assemble restrained joints per manufacturer's instructions.

F. Joint Deflections for Buried Pipe

1. Do not exceed the following deflection angles for unrestrained buried pipe joints:

Pipe Size (inches)	**Maximum Deflection (degrees)**	
	Push-On Joint	**Mechanical Joint**
4	4	6-1/2
6	4	5-1/2
8	4	4
10	4	4
12	4	4
14	4	3
16	4	3
18	4	2-1/2
20	4	2-1/2
24	4	2
30	4	N/A

2. For restrained joints, do not exceed 80% of the manufacturer's recommended maximum deflections.

3. Small angular changes (less than 7 degrees) in horizontal alignment defined in the drawings by a point of inflection (PI) with no accompanying curve data shall be approximated as a curve by deflecting by equal amounts equal length pipe segments to create a curve equally distributed on both sides of the given PI. Accomplish a larger (greater than or equal to 7 degrees) change in horizontal alignment where a curve is not called for in the drawings through the use of an elbow placed at the station of the PI shown in the drawings. Provide thrust restraint as required in the drawings.

4. Small angular changes (less than 5 degrees) in vertical alignment may be accomplished by the use of pulled joints. For larger vertical deflections, place an elbow at the station and elevation of the vertical PI shown in the drawings. Provide thrust restraint as required in the drawings.

5. Assemble joints in accordance with AWWA C600 and the manufacturer's recommendations.

G. Installing Aboveground or Exposed Piping

See Section 15050.

H. Painting and Coating

1. Provide asphaltic coating on buried pipe per AWWA C151.

I. Polyethylene Encasement of Buried Pipe and Fittings

Not used.

J. Hydrostatic Testing

1. Test pressures are shown in Section 15144. Test in accordance with Section 15144.

END OF SECTION

Additional Technical Specifications

Division 00

Division 01

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SECTION 018829 - SEISMIC PERFORMANCE REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Architectural, fire suppression, plumbing, mechanical, and electrical building components and systems and non-building structures that are designed and constructed for seismic demands, unless specifically exempted in ASCE 7.
2. Design and provide complete seismic restraint systems.
3. Provide equipment and product Certifications to be submitted for review by the Engineer. The following systems and components are Designated Seismic Systems and specifically require Certification.

B. Related Requirements:

1. 033010 – Miscellaneous Cast-in-Place Concrete.
2. 050519 – Post-Installed Anchors and Reinforcing Bars.
3. Architectural Components: Refer to various Sections in Division 02 through Division 14.
4. Fire Suppression Components: Refer to various Sections in Division 21.
5. Plumbing Components: Refer to various Sections in Division 22.
6. HVAC Components: Refer to various Sections in Division 23.
7. Electrical Components: Refer to various Sections in Division 26 through Division 28.

1.3 DEFINITIONS AND ABBREVIATIONS

A. Anchorage: Connection to structure typically through the use of welding, bolts, screws, anchor bolts, post-installed anchors or other fasteners selected to meet the Building Code.

B. Authority Having Jurisdiction (AHJ): The governmental agency or subagency that regulates the construction process. This may be a local building department, state agency, federal entity or other body or bodies having statutory authority.

C. Code or Building Code: Building Code currently in effect where the Project is located.

D. Designated Seismic System: Those architectural, electrical and mechanical systems and their components that require seismic design or qualification in accordance with ASCE 7 and for which the component importance factor, Ip, is 1.5 according to ASCE 7.

E. International Accreditation Service, Inc. (IAS).

F. California Building Code (CBC).

G. International Code Council Evaluation Service (ICC-ES).

H. Inspection Agency: Organization or individual accredited to ISO 17020 and regularly engaged in factory inspection services for seismic restraint or qualification of non-structural components and equipment.

I. Nonstructural Component: A part or element of an architectural, electrical or mechanical system permanently attached to a structure including its supports and attachments.

J. Restraint/Bracing: Bracing or anchorage used to limit movement under seismic forces. Cables or rigid elements, i.e., strut, pipe, and angles, used to resist forces by uniaxial tension or compression. Term "bracing" may also be used to describe design to resist lateral forces through the use of wall or frame elements.

K. Seismic Deformations: Drifts, deflections and relative displacements determined in accordance with the applicable seismic requirements of the Building Code.

L. Seismic Demand: Forces and deformations caused by a Code seismic event that must be resisted or accommodated by a structure, component, or system.

M. Seismic Forces: Forces acting in any direction due to the action of an earthquake as defined in the Building Code.

N. Special Inspector: An IAS accredited CBC Special Inspection Agency or qualified Professional Engineer who demonstrates competence, to the satisfaction of the building official (or Authority Having Jurisdiction - AHJ), for inspection of the Designated Seismic System.

O. Support: Elements used to support the weight (gravity load) of an item. Where the support is located at a seismic brace, the element may also resist tension/compression reactions from the restraint system.

P. Vibration Isolation and Seismic Control Manufacturers Association (VISCMA).

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Delegated-Design Submittal: Prepare, seal, and sign seismic restraint Shop Drawings and signed by a Professional Engineer. Indicate restraint details including materials, quantities, anchor bolts, size and embedment of anchor bolts, base plate setting details and locations, and location, direction and magnitudes of project related loads transferred to the structure.
2. Include sufficient information regarding the component attachments to verify compliance with applicable codes and standards.
3. Use of proprietary restraint systems with a Certificate of Compliance verified and listed by an IAS accredited Inspection Agency is acceptable..

C. Seismic Calculations:

1. Prepare, seal, and sign seismic calculations by a Civil or Structural Professional Engineer and submit with Shop Drawings.
2. Include sufficient information regarding component attachments to verify a continuous load path of sufficient strength and stiffness that demonstrates compliance with applicable codes and standards.

D. Special Seismic Certification of Designated Mechanical Equipment, Electrical Equipment and Distribution Systems:

1. Each manufacturer of Designated Seismic System submit a Certificate of Compliance indicating that the component and its mounting system and anchorage have been tested or analyzed to withstand required seismic demands and maintain operability following the design Building Code earthquake. Provide qualification based on shake table testing or by engineering analysis as specified below.
2. Shake Table Testing:

    a. Qualification: Be by an actual test on a shake table with three-dimensional shock tests and an analytical method using dynamic characteristics and forces or experience data based upon nationally recognized procedures acceptable to the Authority Having Jurisdiction and Engineer.
    b. Verify certificate by an IAS accredited Inspection Agency or other independent inspection entity acceptable to the Authority Having Jurisdiction and Engineer.
    c. Label components with an identification applied on the product by manufacturer that contains manufacturer's name, function and performance characteristics of the product or material, and name and identification of accredited Inspection Agency. Indicate that representative sample of the product or material and its testing have been evaluated and listed by accredited Inspection Agency.

3. Engineering Analysis:

    a. If a particular component has not been evaluated by shake table testing and listed by an accredited Inspection Agency, then qualification by analysis performed by a Professional Engineer. Include an evaluation of stress and deformation developed through entire load path from center of applied seismic load to equipment anchorage. Perform analysis considering dynamic characteristics and response spectrum required by the Building Code.
    b. Special Seismic Certification: For distribution systems such as piping and ductwork, include a stress analysis of the pipe and duct, supports, bracing, and anchors. Include gravity and seismic demand stress analysis, an analytical assessment of connections, and consideration for movement of attachment points. In the analysis, consider the effects of in-line devices, where present.

        1) Fire Protection Piping: Conformances with NFPA 13 will satisfy requirements for Special Seismic Certification.

4. Engineer's Qualifications: Submit certification and experience documentation for the Professional Engineer indicating a minimum of 5 years' experience providing engineering services of the kind indicated when analysis or shake table testing is the justification for the Certification for each Designated Seismic System.

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1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For All equipment, accessories, and components, from manufacturer.

B. Welding certificates.

C. Material & Product certificates.

D. Material test reports.

E. Product test reports.

F. Research reports.

1.6 QUALITY ASSURANCE

A. Comply with the California Building Code (CBC) latest adopted Edition by the jurisdiction where the Project is located and applicable local and statewide adopted amendments.

B. Special Seismic Certification: Provide Certification in accordance with CBC, Chapter 17 and ASCE 7 Chapter 13 and 15 requirements for Designated Seismic Systems.

C. Provide Special Inspections for installation, inspection and testing of the following per CBC Chapter 17:

1. Seismic Design Category E:

a. Heating, ventilating and air-conditioning (HVAC) ductwork containing hazardous materials or smoke control and anchorage of such ductwork.
b. Piping systems and mechanical units containing flammable, combustible or highly toxic materials.
c. Anchorage of electrical equipment used for emergency or standby power systems.
d. Vibration-isolated systems and associated seismic restraints where indicated on Contract Documents or submittals. All restraints require a nominal clearance of 0.25 inch or less between the equipment support frame and restraint.
e. Exterior wall panels and their anchorage.
f. Suspended ceiling systems and their anchorage.

1) Verify member type and size, verify that bracing elements such as splayed wires and compression struts are installed as detailed; test anchorage to structure.

g. Steel storage racks 8 feet or higher:

1) Verify that rack connections to the structure are installed as detailed on Shop Drawings. Spot check the connection of horizontal beams to uprights verifying fastener tightness.

h. Access floors:

1) Verify that anchorage matches detail on the Shop Drawings.
2) Verify connection of access floor framing to support posts.
3) Inspect installation of post-installed anchors.
4) Test post installed anchors.

i. Electrical equipment.

1.7 FIELD QUALITY CONTROL

A. Special Seismic Certifications:

1. Verify that the label, anchorage and mounting conform to the Certificate of Compliance for Designated Seismic Systems.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Provide seismic restraint of nonstructural components to withstand seismic demands without displacing or overturning.

B. Provide non-building structures designed and constructed to withstand seismic demands as specified herein.

C. For Designated Seismic Systems, provide installations capable of providing post-earthquake functionality.

2.2 PROJECT SEISMIC DESIGN CRITERIA

A. Seismic Design Category E.

B. Seismic Design Force: Base calculation of seismic design force on requirements of ASCE 7 including Chapter 11 through Chapter 15 with the following seismic design parameters:

1. $S_S = 2.053$: Mapped Short Period Spectral Response Acceleration Parameter.
2. $S_1 = 0.781$: Mapped 1 s. Spectral Response Acceleration Parameter.
3. $S_{DS} = 1.367$: Design Short Period Spectral Response Acceleration Parameter.
4. $S_{D1} = 0.884$: Design 1 s. Spectral Response Acceleration Parameter.
5. $I_e = 1.25$: Building or Structure Importance Factor.
6. $I_P = 1.0$: Component Importance Factor.

C. Seismic Relative Displacement: Ensure design accommodates seismic relative displacement of 0.02 times the story height in addition to thermal movement that may be present.

D. Seismic Separation between Independent Structures – Design components crossing seismic separations accommodate relative seismic movement between structures. Locations of seismic

separations are shown on the drawings. Use the following to determine the range of movement required at each floor. Independently anchor components to each structure.

1. Δ A1-B1 = XX" (i.e., +/- xx"/2).
2. Δ A2-B2 = XX" (i.e., +/- xx"/2).
3. Δ A3-B3 = XX" (i.e., +/- xx"/2).
4. Δ ARoof-BRoof = XX" (i.e., +/- xx"/2).

2.3 MATERIALS

A. Anchor Bolts and Post-Installed Anchors:

1. Cast-in Anchor Bolts or Headed Studs: Use whenever possible and design in accordance with Section 1912 of the CBC and ACI 318 Chapter 17. Do not use post-installed expansion anchors for critical fastening such as vibrating conditions and impact loads.
2. Expansion or Sleeve Anchors: Pre-qualify for use in seismic applications per ASTM E 488 and current ICC-ES evaluation reports.
3. Adhesive Anchors: Pre-qualify for use in seismic applications per ASTM E 488 and current ICC-ES evaluation reports.
4. For components weighing over 400 pounds: Minimum 5/8-inch diameter anchor size with minimum 5-inch embedment.
5. For components weighing less than 400 pounds: Minimum 3/8-inch diameter anchor size with minimum 3-inch embedment.

PART 3 - EXECUTION

3.1 COORDINATION

A. Do not fabricate or install seismic restraints or non-building structures until submittals have been approved by the Engineer.

B. Verify that multiple systems installed in the same vicinity can be installed without conflict.

C. Verify tolerances between installed items to confirm that unbraced components will not come into contact with restrained equipment or structural members during an earthquake. When contact is possible, provide seismic restraint or provide justification to Engineer’s satisfaction that contact will not cause unacceptable damage to the components in contact, their supports, finishes or other elements that are contacted.

3.2 DESIGN AND GENERAL CONSTRUCTION

A. Attach or anchor components and their supports, non-building structures, and Designated Seismic Systems to the structure. Provide a continuous load path of sufficient strength and stiffness between the component and the supporting structure.

B. Design equipment support and bracing to resist seismic design force in any direction.

C. Provide supports, braces, connections, hardware, and anchoring devices to withstand code-required seismic forces and seismic deformations without shifting or overturning.

D. For components with Ip = 1.5, in addition to providing for code-required seismic forces and deformations, construct installations capable of providing post-earthquake functionality.

E. Bolt, weld, or otherwise positively fastened component attachments in accordance with ASCE 7 Chapter 13 without consideration of frictional resistance produced by the effects of gravity.

F. Where equipment is mounted on vibration isolators and restraints, use isolators and restraints designed for amplified code forces per ASCE 7 and with demonstrated ability to resist required forces including gravity, operational, and seismic forces.

G. As an alternate to project-specific design of seismic bracing, use of proprietary restraint systems with a Certificate of Compliance verified and listed by an accredited Inspection Agency is acceptable. Use of a certified product does not preclude the requirement for Shop Drawings.

H. Design piping, piping risers, ducts, and duct risers to accommodate interstory drift.

I. Provide flexible connections:

1. Between floor-mounted equipment and suspended piping.
2. Between unbraced piping and restrained suspended items.
3. As required for thermal movement.
4. At building separations and seismic joints.
5. Wherever relative differential movements could damage piping in an earthquake.

J. Where piping is explicitly exempt from seismic bracing requirements, provide flexible connections between piping and connected equipment, including in-line devices such as VAV boxes and reheat coils.

K. Where piping is explicitly exempt from seismic bracing requirements, install piping such that swinging of the pipes will not cause damaging impact with adjacent components, finishes or structural framing. This will be considered satisfied if there is horizontal clear distance of at least 2/3 the hanger length between subject components. If swinging of exempted piping can cause damaging contact with adjacent components, finishes or structural framing, add swing restraints as required to eliminate contact.

L. Ductwork:

1. Provide independent support for in-line devices weighing more than 20 pounds.
2. Provide independent support and bracing for in-line devices weighing more than 75 pounds.

M. Provide unbraced piping attached to braced in-line equipment with adequate flexibility to accommodate differential displacements.

N. Tanks:

1. Design tank to resist seismic design forces.
2. Design tank anchorage to resist seismic design forces.

3. Design tank legs or supporting structure to resist seismic design forces.
4. Provide flexible connections between tank and interconnected piping.

O. Fire suppression equipment and piping:

1. See requirements for piping.
2. See requirements for equipment.
3. Satisfy requirements of NFPA 13 and the force and displacement requirements of ASCE 7. All components: UL listed.
4. Provide end of line restraint as required by NFPA 13.

P. Conduit, cable tray, bus duct, raceways, bundled cabling:

1. Provide gravity support for conduit/cable tray/bus duct/raceway/bundled cabling that is independent of suspended ceiling framing.
2. Provide seismic bracing of conduit/cable tray/bus duct/raceway/bundled cabling to resist gravity and seismic design forces.
3. Design conduit/cable tray/bus duct/raceway/bundled cabling to accommodate interstory drift.
4. Provide flexible connections wherever relative differential movement could damage conduit/cable tray/bus duct/raceway/bundled cabling in an earthquake.

END OF SECTION 018829

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SECTION 018839 - WIND PERFORMANCE REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Performance requirements and design criteria for wind restraint.
2. Delegated Design of structures, exterior equipment and components, nonstructural components and nonbuilding structures, due to the action of wind, to be designed by performance specification and where otherwise indicated on Drawings.
3. Requirements regarding applicable Codes, basis-of-design, and load criteria to be used in the detailed design of delegated design project components and systems to be designed under other Sections.
4. Design and provide complete wind restraint systems.

1.3 DEFINITIONS

A. Anchorage: Connection to structure typically through the use of welds, bolts, screws, anchor bolts, post-installed anchors, or other fasteners selected to meet the Building Code.

B. Component: A part of an architectural, electrical, or mechanical system which is manufactured as an independent unit, subsystem, or subassembly, that can be joined with other parts to form a more complex item or assembly.

C. Nonstructural Component: A part of an architectural, mechanical, or electrical system within or without a building or nonbuilding structure including its supports and anchorage.

D. Restraint/Bracing: Restraint, bracing or anchorage used to limit movement under wind forces. Cables or rigid elements, i.e., strut, pipe, and angles, used to resist forces by uniaxial tension or compression. Term "bracing" may also be used to describe design to resist lateral forces through the use of wall, beam, or frame elements.

E. Special Inspector: An International Accreditation Service (IAS) accredited CBC Special Inspection Agency or qualified Professional Engineer who demonstrates competence, to satisfaction of building official or Authority Having Jurisdiction (AHJ), for inspection of Delegated Design components and nonstructural systems.

F. Support: Elements used to support the weight (gravity load) of an item. Where support is located at a wind brace, the element may also resist tension/compression reactions, and bending moments from the restraint system.

G. Wind Deformations: Drifts, deflections and relative displacements determined in accordance with the applicable wind requirements of the Building Code.

H. Wind Demand: Forces and deformations caused by Building Code wind loads that must be resisted or accommodated by a structure, system, component, restraint/bracing, anchorage or support.

I. Wind Forces: Forces acting in any direction due to the action of wind as defined in the Building Code.

1.4 ACTION SUBMITTALS

A. Provide wind restraint submittals with associated structure, equipment, or component submittal.

B. Product Data: For each type of product.

1.5 DELEGATED DESIGN SUBMITTALS

A. Provide wind restraint submittals with associated structure, equipment, or component submittal.

B. Delegated design professional to provide necessary additional special tests and inspection requirements covering the work of their submittal. Identify items that necessitate inspections not already identified in Contract Documents.

C. Submit analysis data documenting compliance with design criteria.

D. Shop Drawings:

1. Submit wind restraint Shop Drawings that are prepared, sealed, and signed by a Professional Engineer.
2. Include plans, elevations, sections, mounting and anchorage details in submittal. Indicate restraint details including member sizes, materials, quantities, anchorage details including size and embedment of anchor bolts, base plate setting details and locations, and location, direction and magnitudes of project related loads transferred to the structure.
3. Include sufficient information regarding component anchorage to verify compliance with this Section and applicable Codes and Standards.
4. Anchorage Layout Drawings, indicating size and location of anchorage bolts in relation to supporting substrate materials.

    a. Details of structure, equipment, or component anchorage to foundation or structure, including anchor type, size, material, embedment depth, and minimum edge distance.
    b. Summary of maximum vertical and horizontal reactions at each anchor considering applicable load and load combinations, based upon specified design criteria.
    c. Vibration Isolation Base Details: Where required, detail fabrication including anchorages and attachment. Include adjustable motor bases, rails, and frames for equipment mounting.

d. Identify specified loads and load combinations. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

E. Calculations:

1. Prepare, seal, and sign calculations by a Professional Engineer and submit with Shop Drawings.
2. Include sufficient information regarding component restraints, attachments, and anchorage to verify a continuous load path of sufficient strength and stiffness that demonstrates compliance with this Section and applicable Codes and Standards.
3. Calculations are submitted for Project record and will not be reviewed by Engineer.

1.6 QUALITY ASSURANCE

A. Comply with the California Building Code (CBC) latest adopted Edition by jurisdiction where the Project is located and applicable local and statewide adopted amendments.

B. Engineering Responsibility: Preparation of comprehensive engineering analysis and Shop Drawings by a registered professional engineer who is legally qualified to practice in State and jurisdiction where Project is located.

PART 2 - PRODUCTS

2.1 GENERAL

A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section 014000 "Quality Requirements," to design wind restraint related systems.

B. Select products meeting requirements of applicable Codes.

2.2 SYSTEM DESCRIPTION

A. Provide wind restraint of nonstructural components to withstand wind demands without displacing or overturning.

B. Provide non-building structures designed and constructed to withstand specified wind demands.

2.3 PROJECT WIND DESIGN CRITERIA

A. Use following basic wind design criteria in project calculations. Determine other factors in accordance with ASCE 7.

1. Basic Wind Speed:

a. V_{ULT} = 102 miles per hour miles per hour.
b. V_{ASD} = 80 miles per hour miles per hour.

2. Wind Exposure Category: C.
3. Risk Category: III.

2.4 COMBINATION OF LOADS

A. Use wind loads in combination with all other applicable design loads, including but not limited to dead loads, live loads, rain loads, snow loads, ice loads, seismic loads, flood loads, earth and ground water pressures, and self-straining in accordance with load combinations of ASCE 7 and the Code.

B. Determine most severe distribution, concentration, and combination of design loads and forces and then use in the design conforming with the Code. Design to meet code requirements and to satisfy all combinations of loads.

PART 3 - EXECUTION

3.1 COORDINATION

A. Verify that multiple systems installed in same vicinity can be installed without conflict.

B. Use wind design criteria in conjunction with appropriate load factors and load combinations in accordance with ASCE 7 and the Code.

C. Do not fabricate or install wind restraints until submittals have been approved by Engineer.

3.2 DESIGN AND GENERAL CONSTRUCTION

A. Design component, support, and bracing to resist wind design force in any direction.

B. Provide supports, braces, connections, hardware, and anchoring devices to withstand Code-required wind forces, including maximum permissible displacements, without shifting and overturning.

C. Attach or anchor components and their supports to the structure. Provide a continuous load path meeting requirements of this Section and applicable Codes and Standards between the component and supporting structure.

END OF SECTION 018839

Division 02

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SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.
4. Waste management and disposal of demolished materials, including salvage, recycling, and diversion from landfill.

    a. Selective demolition to support future expansion and renovation work, including provisions for protecting construction to remain.

B. Related Requirements:

1. Section 01112 "Description of Work" for general scope of work.
2. Section 01323 "Construction status Reports" for status reports.
3. Section 01740 "Demobilization" for site clearing and removal of above- and below-grade improvements not part of selective demolition.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Remove Hazardous Materials: Isolate and remove hazardous materials from existing construction and properly dispose as required by existing regulations.

C. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

D. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

E. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

F. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor. Contractor shall sort materials in accordance with waste management plan and local recycling guidelines.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

A. Engineering Survey: Submit engineering survey of condition of building.

B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

C. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

D. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition

operations. Comply with Section 01322 “Construction Progress Photography." Submit before Work begins.

E. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

F. Waste Management Plan: Submit a plan describing procedures for reuse, recycling, and disposal of non-hazardous demolition materials. Indicate anticipated quantities and types of materials to be salvaged, recycled, or disposed of in landfill. The plan shall include Company-based compliance, documentation procedures during construction and Universal waste compliance and verification.

1.7 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

1.8 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Engineer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If suspected hazardous materials are encountered, do not disturb; immediately notify Engineer and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

G. Contractor shall provide and maintain daily cleaning of demolition area to prevent dust migration and ensure safe access.

1.9 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so

as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:

B. Notify warrantor on completion of selective demolition and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.10 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

C. Environmental Requirements: Comply with applicable local sustainability ordinances related to material reuse and recycling goals. Comply with CALGreen Code Section 5.408.1 Construction Waste Management.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Perform or Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

D. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.

E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.

1. Comply with requirements specified in Section 01322 "Construction Progress Photography."
2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
3. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.3 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01572 “Erosion Control Plan."

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during and for at least **4** hours after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
10. Dispose of demolished items and materials promptly.
11. Separate and stockpile recyclable and salvageable materials where practical. Do not commingle with general demolition debris.
12. Remove demolished materials from site as work progresses. Transport materials to approved recycling or disposal facilities.
13. Provide documentation of material weights or volumes diverted from landfill through reuse or recycling.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Engineer, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished and then break up and remove.

E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."

F. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Division 07 for new roofing requirements.

1. Remove existing roof membrane, flashings, copings, and roof accessories.
2. Remove existing roofing system down to substrate.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

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SECTION 030130.71 - MODIFICATIONS TO EXISTING CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Cutting, removing, or modifying parts of existing concrete structures or appurtenances.
2. Addressing existing steel reinforcing bars encountered.
3. Bonding new concrete or grout to existing concrete.

B. Related Requirements:

1. Section 033010 “Miscellaneous Cast-in-Place Concrete” for related work.
2. Section 036000 “Grouting” for grout and related accessories.
3. Section 050519 “Post-Installed Anchors” for anchors and related accessories.
4. Section 055000 “Metals Fabrications” for various metals and related fabrications.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Submit manufacturer's technical literature and installation instructions that include:

a. Current printed recommendations and product data sheets for products including performance criteria, product life, working time after mixing, surface preparation and application requirements and procedures, curing, volatile organic compound data, and safety requirements.
b. Storage requirements including temperature, humidity, and ventilation.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: Documentation of the qualifications for Contractor qualifications, Manufacturer's qualifications, and Contractor's supervisor as specified in Part 1 “Quality Assurance” Article.

B. Material Certificates: For each material provided.

1.5 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Have a minimum of ten years' experience within last 10 years in manufacture and use of specified products and have an ongoing program of training, certifying, and technically supporting Contractor's personnel.

B. Contractor Qualifications: Complete a program of instruction in application of approved manufacturer's material and provide certification from manufacturer attesting to their training and status as an approved applicator.

C. Contractor's Supervisor: Have attended a training program sponsored by manufacturer supplying materials approved for this project.

D. Manufacturer's Representative: A representative of product manufacturer who will visit the site for first three days of installation to give instructions to installation crew. Make periodic site visits to ensure products being installed are in accordance with published instructions.

E. Be solely responsible for workmanship and quality of modification work. Inspections by the manufacturer, the Engineer, or others do not limit Contractor's responsibility for work quality.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials in original, new and unopened packages and containers clearly labeled with the following information:

1. Manufacturer's name.
2. Name or title of material, and other product identification.
3. Manufacturer's stock number and batch number.
4. Date of manufacture.
5. Instructions.
6. Expiration date.

B. Storage: Store products in accordance with manufacturers' published recommendations and the following supplementary requirements:

1. Store only approved materials on site and in locations as directed.
2. Keep area clean and accessible.
3. Comply with health and fire regulations including those of the Occupational Safety and Health Administration (OSHA).

C. Handling: Handle products carefully and in accordance with manufacturers' published recommendations and the following supplementary requirements:

1. Prevent inclusion of foreign materials.
2. Do not open containers or mix components until necessary preparatory work has been completed and application work will start immediately.

Division 03

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with this Section and applicable state and local regulations.

B. Epoxy Bonding Agent:

1. Product: Two-component, solvent-free, asbestos-free moisture insensitive epoxy resin material used to bind plastic concrete to hardened concrete and complying with requirements of ASTM C 881, Type V, Grade 2, Class C.

C. Epoxy Paste Adhesive:

1. Product: Two-component, solvent-free, moisture insensitive epoxy resin material used as an adhesive for mating surfaces where the glue line is 1/8 inch or less and to bond fresh, plastic concrete to clean, sound hardened concrete and complying with requirements of ASTM C 881, Type IV, Grade 3, Class C.

D. Repair Mortar (Polymer-Modified Portland Cement Mortar):

1. Horizontal Surfaces:

a. Product: Two-component polymer-modified, portland cement based mortar used to repair horizontal surfaces with a migrating corrosion inhibitor and having a minimum compressive strength of 7,000 psi at 28 days tested in accordance with ASTM C 881 or ASTM C 109.

2. Vertical and Overhead Surfaces:

a. Product: Two-component polymer-modified, portland cement based, fast setting, non-sag mortar used to repair vertical and overhead surfaces with a migrating corrosion inhibitor and having a minimum compressive strength of 5,000 psi at 28 days tested in accordance with ASTM C 881 or ASTM C 109.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which modification work is to be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

B. Examine substrates and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances and other conditions affecting performance of the Work.

3.2 INSTALLATION - GENERAL

A. Do not shift, cut, remove, or otherwise alter existing structure or concrete until authorization is given by the Engineer.

B. When removing materials from or making openings in existing structures, take precautions and erect necessary barriers, shoring and bracing, and other protective devices. Prevent damage to structures beyond limits necessary for new work, protect personnel, control dust, and to prevent damage to structures or contents by falling or flying debris.

C. Unless otherwise permitted, shown, or specified, cut existing concrete by line drilling.

D. Construction Tolerances: Comply with requirements specified elsewhere in Division 03, except as modified herein, and elsewhere in Contract Documents.

E. Make locations and phases of the work available for access by the Engineer or other personnel designated by the Engineer. Provide ventilation and safe access to the work.

F. Cut, remove, or otherwise modify parts of existing structures or appurtenances as indicated, specified, or as necessary to complete the work. Finishes, joints, reinforcements, sealants, and similar materials are specified in their respective Sections. Install work complying with requirements of this Section and as indicated.

G. Locations, details, and limits of modifications are indicated on Drawings. Comply with requirements of this Section and as indicated on Drawings.

H. Examine areas and conditions under which modification work is to be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

I. Store, mix, apply, and cure materials in strict compliance with manufacturer's instructions.

J. Where concrete is to be modified near an expansion joint or control joint, preserve isolation between components on either side of the joint.

K. When drilling holes for dowels and bolts or when coring holes for slab or wall penetrations, stop drilling if reinforcing is encountered. Do not cut reinforcing without prior approval by the Engineer. Relocate hole to avoid reinforcing as approved by the Engineer.

1. Identify reinforcing locations prior to drilling using reinforcing bar locators so that drill hole locations may be adjusted to avoid reinforcing interference.

L. Saw-cut edges for modification areas vertically and horizontally straight. Make intersecting cuts perpendicular to each other.

M. Stop saw cutting if reinforcing is encountered. Do not cut reinforcing without prior approval by the Engineer. Identify reinforcing locations within 1 foot of saw cut locations in any direction prior to saw cutting using reinforcing bar locators.

N. Clean concrete surfaces of efflorescence, deteriorated concrete, dirt, laitance, and existing repair materials such as liners, adhesives, and epoxies. Remove foreign matter and deleterious films by sandblasting, oil-free air-blasting, scarifying, or other mechanical means to sound original concrete.

O. Consolidate modification materials, completely filling portions of the area to be filled.

P. Bring finished surfaces into alignment with adjacent existing surfaces to provide a uniform, flush, and even surface. Match repair surfaces to adjacent existing surfaces in texture including any coatings or surface treatments that had been provided for the existing structure.

Q. Repair or replace concrete indicated or specified to be left in place that is damaged because of the work by approved means without additional compensation.

3.3 CONCRETE REMOVAL

A. When removing materials from or making openings in existing structures, take precautions and erect necessary barriers, shoring and bracing, and other protective devices. Prevent damage to structures beyond limits necessary for new work, protect personnel, control dust, and to prevent damage to structures or contents by falling or flying debris.

B. Concrete designated to be removed to specific limits indicated or directed by the Engineer, perform saw cutting 1 inch deep at limits of removal followed by line drilling and chipping, sandblasting, or oil-free airblasting, as appropriate in the areas where concrete is to be taken out. Remove concrete such that surrounding concrete and existing reinforcing to be left in place and existing in place equipment are not damaged.

1. Perform full thickness saw-cutting at limits of concrete to be removed only if indicated, herein specified, or after obtaining written approval from the Engineer.

C. Where existing reinforcing is exposed due to saw cutting or line drilling and no new material is to be placed on cut surface, apply a 1/4 inch thick surface treatment of epoxy paste to entire cut surface.

D. Where joint between new concrete or grout and existing concrete will be exposed in finished work, remove concrete edge by making a 1 inch deep saw cut on each exposed surface of existing concrete or as indicated.

3.4 CONNECTION SURFACE PREPARATION

A. Concrete areas requiring patching, repairs, or modifications, prepare connection surfaces as specified, as indicated, or as directed by the Engineer.

B. Remove loose and deteriorated materials, efflorescence, existing repair materials, dirt, oil, grease, and other bond inhibiting materials from concrete surface by dry mechanical means such as sandblasting, chipping, wire brushing, or other mechanical means as approved by the Engineer.

1. Uniformly roughen concrete surface to approximately 1/4 inch amplitude with pointed chipping tools. Thoroughly clean surface of loose or weakened material by sandblasting or air-blasting.
2. Irregular voids or surface stones need not be removed if they are sound, free of laitance, and firmly embedded into parent concrete.

C. If reinforcing steel is exposed, mechanically clean to remove loose material, contaminants, and rust as approved by the Engineer. If half of reinforcing steel diameter is exposed, chip out behind the steel. Chip distance behind the steel to a minimum of 1 inch. Do not damage reinforcing to be incorporated in new concrete or repair mortar during removal operation.

D. Clean reinforcing from existing removed or deteriorated concrete that is shown to be incorporated in new concrete or repair mortar by mechanical means to remove loose material and products of corrosion before proceeding. Cut, bend, or lap to new reinforcing as indicated and provide with 1 inch minimum clear cover.

E. Use following specific concrete surface preparation Methods where indicated, specified, or as directed by the Engineer:

1. Method A:

    a. Roughen and clean existing concrete surface at connection.
    b. Thoroughly saturate surfaces with water; prevent standing water during application.
    c. Scrub cement paste (cement and water mixed to consistency of a thick paste) into substrate filling concrete pores and voids.
    d. Place new concrete against scrub coat of cement paste while cement paste is still plastic.

2. Method B:

    a. Roughen and clean existing concrete surface at connection.
    b. Apply epoxy bonding agent at connection surfaces.
    c. Place new concrete or grout mixture to limits indicated within time constraints recommended by manufacturer to ensure bond.

3. Method C:

    a. Use adhesive anchoring system, as specified in Section 050519 “Post-Installed Anchors,” for installation of reinforcing steel dowels into existing concrete where indicated.
    b. Perform installation complying strictly with manufacturer's recommendations, including drill bit diameter, surface preparation, injection, and installation of dowels.
    c. Drill concrete to embedded deformed bars to indicated depths.
    d. Use oil-free compressed air to blast out loose particles and dust from drilled holes. Clean dowels to be free of dirt, oil, grease, ice, or other deleterious material that would reduce bond.
    e. Concrete in existing structures is considered to have a strength of 3,000 psi.

4. Method D:

    a. Combination of Method B & Method C.

3.5 GROUTING

A. Grout: As specified in Section 036000 “Grouting.”

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect completed installations.

1. Perform inspection with Contractor, material installer, and the Engineer present. Give minimum of 72 hours’ notice prior to time of inspection.
2. Repair modifications not in conformance with Contract Documents in accordance with manufacturer's instructions at no additional cost to Owner.
3. At completion of non-conforming repairs, Contractor, material installer, and the Engineer to reinspect the repaired problem areas.
4. Prepare inspection reports, identifying acceptable work, type and locations of unacceptable work, and actions taken to correct unacceptable work.
5. Complete field quality control work without additional compensation.

END OF SECTION 030130.71

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SECTION 033010 – MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 036000 “Grouting” for grouting.
2. Section 050519 “Post-Installed Anchors” for post installed adhesive anchoring system.
3. Section 312000 "Earthwork" for drainage fill under slabs-on-grade.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with fly ash or ground granulated blast furnace slag; materials subject to compliance with requirements.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete Subcontractor.

2. Review steel reinforcement installation; anchor rod and anchorage device installation tolerances; construction, joints; forms and form removal limitations; cold- and hot-weather concreting procedures; packaged dry combined materials; curing procedures; concrete finishes and finishing; special inspection and testing, and Contractor’s inspecting agency procedures for field quality control; concrete repair procedures, and concrete protection.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Concrete Design Mixtures: Design Mixtures: For each formulation of concrete proposed for use, submit constituent quantities per cubic yard (cubic meter), water cementitious ratio, air content, concrete slump, type and manufacturer of cement and type and manufacturer of fly ash or ground granulated blast furnace slag. Provide either:

1. Standard deviation data for each proposed concrete mix based on statistical records.
2. Water cementitious ratio curve for concrete mixes based on laboratory tests.

C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, spacing, lengths, material, grade, bar schedules, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, and supports for concrete reinforcement. Reference bars to be the same identification marks shown on the bar bending details.

D. Construction Joint Layout: As shown on the Drawings.

E. Material Certificates: For each of the following:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Curing compounds.
6. Bonding agents.

F. Material Test Reports: For the following, from a qualified testing agency:

1. Aggregates**:** Conformance to ASTM standards, including sieve analysis, mechanical properties, and deleterious substance content, and mortar bar expansion test results, proof that the aggregate non-reactive.
2. Mill Test Reports: Conformance to ASTM standards, including chemical analysis and physical tests.

    a. Cementitious materials.
    b. Steel Reinforcing.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For independent testing agency responsible for concrete design mixtures.

B. Certifications:

1. Certify that admixtures used in the same concrete mix are compatible with each other and the aggregates.
2. Certificate of conformance for concrete production facilities from the NRMCA.

C. Field quality-control reports.

D. Minutes of preinstallation conference.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1077 and ASTM E329 for testing indicated.

1. Verify personnel conducting field tests qualified as ACI Concrete Field-Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Verify personnel performing laboratory tests are ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Verify Testing agency laboratory supervisor is an ACI-certified Concrete Laboratory Testing Technician, Grade II.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Provide reinforcement free from mill scale, rust, mud, dirt, grease, oil, ice, or other foreign matter that will reduce or destroy bond. Deliver, store, and handle steel reinforcement to prevent bending and damage. Store reinforcement off the ground, protect from moisture, and keep out of standing water, and free from rust, mud, dirt, grease, oil, ice, or other contaminants and deleterious matter that will reduce or destroy bond.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Store materials according to manufacturer instructions. Limit total storage time from date of manufacture to date of installation to six months or the manufacturer’s recommended storage time, whichever is less.

D. Remove immediately from the site material which becomes damp, contains lumps, or is hardened and replace with acceptable material.

E. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location.
2. Provide additional protection according to manufacturer instructions.

1.9 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures:

1. When average of the highest and lowest temperature from midnight to midnight is expected to fall below 40 deg F for three successive days, maintain delivered concrete temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301 Specifications for Structural Concrete.
2. ACI 117 Specification for Tolerances for Concrete Construction and Materials.

2.2 FORM-FACING MATERIALS

A. Surface Finish 2.0 Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

    a. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.

3. Overlaid Finnish birch plywood.

B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

C. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces. Form-release agent to comply with Federal, State and local VOC limitations.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

D. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete, heavy high frequency vibration of the concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to retaining walls.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615/A615M, Grade 60, new deformed bars.

B. Steel Bar Mats: ASTM A184/A184M, fabricated from ASTM A615/A615M, Grade 60, deformed bars, assembled with clips.

C. Welded Wire Fabric: ASTM A184, fabricated from ASTM A615 or ASTM A706, Grade 60 ksi.

2.4 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete of greater compressive strength than the specified concrete strength, according to CRSI's "Manual of Standard Practice," and as follows:

1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

B. Tie wires for reinforcement: 16 gauge or heavier black annealed wire to tie uncoated reinforcing.

2.5 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type II. Total equivalent alkali content of the cement used not to exceed 0.60 percent as provided in the Optional Chemical Requirements of ASTM C150.
2. Fly Ash: ASTM C618, Class F.
3. Ground Granulated Blast Furnace Slag: ASTM C989/C989M, Grade 100 or 120.

C. Normal-Weight Aggregates: ASTM C33/C33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: As indicated by concrete mixtures specified herein.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C260/C260M.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Accelerating Admixture: ASTM C494/C494M, Type C.
4. Water: ASTM C94/C94M and potable.

2.6 CURING MATERIALS

A. Absorptive Cover: AASHTO M182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

B. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1-D, Class B, dissipating.

2.7 RELATED MATERIALS

A. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types V, load bearing, for bonding freshly mixed concrete to hardened concrete.

2.8 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: limit percentage, by weight, of cementitious materials (Portland cement alone or in combination with Fly Ash or Ground Granulated Blast Furnace Slag) in concrete as follows:

1. Fly Ash: 25 percent.
2. Ground Granulated Blast Furnace Slag: 50 percent.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture in concrete, for placement and workability.
2. High-range water-reducing admixture in concrete, may be used, for placement and workability.

2.9 CONCRETE MIXTURES

A. Concrete Fill and Electrical Raceway Encasement:

1. Minimum Compressive Strength: 2500 psi at 28 days.
2. Maximum W/C Ratio: 0.62.
3. Slump Limit: 3 inches plus or minus 1 inch.
4. Air Content: 4 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
5. Coarse Aggregate: ASTM C33, size 57 for concrete fill or as indicated in Section 03800 for electrical raceway encasements.

B. Structural Concrete 10-in or greater in thickness:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum W/C Ratio: 0.44.
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: 4 percent, plus or minus 1.5 percent at point of delivery.
5. Coarse Aggregate: ASTM C33, size 57.

C. Structural Concrete 10-inch or less in thickness:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum W/C Ratio: 0.44**.**
3. Slump Limit: 4 inches, plus or minus 1 inchAir Content: 4 percent, plus or minus 1.5 percent at point of delivery.
5. Coarse Aggregate: ASTM C33, size 67.

2.10 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.11 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94/C94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Erect, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Use form-facing materials as required to meet the surface finishes (SF) requirements of ACI 301, unless otherwise specified provide as-cast form finishes per ACI 301 as follows.

1. Surface Finish (SF-2.0)

D. Construct forms tight to prevent loss of concrete mortar.

E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where necessary. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, ice, snow and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations must be maintained.

1. Leave formwork for structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing materials are not acceptable for exposed surfaces. Re-apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Engineer.

3.4 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose mill scale, rust, mud, dirt, grease, oil, ice, and other foreign materials that reduce or destroy the bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum clear concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Splicing:

1. Lengths of splices as indicated on the Drawings.
2. If not indicated on Drawings, locate reinforcement splices at point of minimum stress.

3.5 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated.
2. Locate joints for foundations in the middle third of spans.
3. Locate horizontal joints in walls and at the top of footings.
4. Space vertical joints in walls as indicated on the Drawings.
5. At construction joints and at concrete joints indicated on Drawings to be "roughened", uniformly roughen the surface of concrete to a full amplitude (distance between high and low points and side to side) of 1/4 inch with chipping tools to expose a fresh face. Thoroughly clean joint surfaces of loose or weakened materials by waterblasting or sandblasting and prepare for bonding. At least two hours before and again shortly before the new concrete is deposited, saturate joints with water. After glistening water disappears, coat joints with neat cement slurry mixed to consistency of very heavy paste. Coat surfaces to a depth of at least 1/8 inch thick, scrubbed-in by means of stiff bristle brushes. Deposit new concrete before the neat cement dries.
6. Do not use keyways in construction joints unless specifically shown on the Drawings or approved by the Engineer.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

C. Identify water to be withheld at concrete batch plant to be added at Project site with high-range water-reducing admixtures. Constant quantity of water to be withheld from each batch of concrete. A maximum of 10 gallons of water may be withheld from each batch of concrete.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid “cold” joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
4. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

E. Slabs and equipment foundations:

1. Maintain reinforcement in position on chairs during concrete placement.
2. Screed surfaces with a straightedge and strike off to correct elevations.
3. Slope surfaces uniformly to drains where required.
4. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.7 FINISHING SURFACES

A. Finish concrete surfaces according to ACI 301 and ACI 318.

B. Surface Finish 2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

C. Rubbed Finish: Apply a Smooth-Rubbed Finish per ACI 301 to exposed Surface Finish 2.0 as-cast vertical concrete surfaces as specified.

D. Float Finish: Apply float finish per ACI 301 prior to broom finish or trowel finish.

E. Broom Finish: After concrete has received a float finish, apply to smooth-formed-finished as-cast concrete surfaces subject to pedestrian traffic. Provide broom finish perpendicular to direction of pedestrian traffic.

F. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 MISCELLANEOUS CONCRETE ITEM INSTALLATION

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and chamfers.

C. Equipment Pads:

1. Coordinate sizes and locations of concrete pads with actual equipment provided.
2. Install reinforcing dowels; to connect concrete pad to concrete floor, unless otherwise indicated.
3. For supported equipment, install anchor bolts that extend through concrete pad and anchor into structural concrete substrate.
4. Prior to placing concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Cast anchor-bolt insert into pads. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.9 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305.1 for hot-weather protection during curing.

B. Formed Surfaces: Cure formed concrete surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

3.10 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repair surfaces containing defects. Surface defects include color and texture irregularities, voids, cracks, spalls, air bubbles, bug holes, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

D. Limit sawcut at the perimeter of the area to a depth of 3/4 inch. Make edges of cuts perpendicular to concrete surface. Prepare surfaces per patching mortar manufacturer’s recommendations.

E. Repairing Formed Surfaces:

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects using patching mortar. On surfaces exposed to view repair by blending white Portland cement and standard Portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Engineer.

F. Repairing Unformed Surfaces:

1. Inspect unformed surfaces, such as tops of foundations or equipment pads, for finish and verify surface tolerances specified for each surface.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Limit sawcut at the perimeter of the area to a depth of 3/4 inch. Finish repaired areas to blend into adjacent concrete.
4. Repair defective areas, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Mix patching mortar per manufacturer’s recommendations, including coarse aggregate when required. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

5. Correct crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

G. Perform structural repairs of concrete, subject to Engineer's approval, using epoxy adhesive and patching mortar.

H. Repair materials and installation not specified above may be used, subject to Engineer's approval.

3.11 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing and inspection agency to perform field tests and inspections and prepare test reports.

B. Notify the Owner when the reinforcing is complete and ready for inspection, at least six working hours prior to the proposed concrete placement. Do not cover reinforcing steel with concrete until the installation of the reinforcement, including the size, spacing and position of the reinforcement has been inspected by the Owner’s inspection agency and the Owner’s inspection agency release to proceed with the concreting has been obtained. Keep forms open until the Owner’s inspection agency has completed inspection of the reinforcement.

C. Concrete Tests: Perform testing of composite samples of fresh concrete obtained according to ASTM C172/C172M according to the following requirements by the Owner’s testing agency:

1. Testing Frequency: One composite sample for each day's placement of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
2. Testing Frequency: One composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.

    a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.

3. Slump: ASTM C143/C143M; one test at point of discharge for each composite sample, but not less than one test for each day's placement of each concrete mixture. Additional tests will be performed when concrete consistency appears to change.
4. Air Content: ASTM C231/C231M, pressure method, for concrete; one test for each composite sample at the point of placement, but not less than one test for each day's placement of each concrete mixture.
5. Concrete Temperature: ASTM C1064/C1064M; one test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
6. Compression Test Specimens: ASTM C31/C31M.

    a. Cast and cure one set of five 6 inch x 12 inch long standard cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C39/C39M; test one specimen at 7 days, test one specimen at 14 days, test two specimens at 28 days. The fifth may be used to verify strength after 28 days if the 28-day test results are low.
8. Strength of each concrete mixture will be satisfactory if every average of any three-consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
9. Report test results in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Verify reports of compressive-strength tests contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break.
10. Additional Tests: Testing and inspecting agency to make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Engineer.
11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION 033010

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SECTION 036000 - GROUTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cement grout.
2. Concrete grout.
3. Nonshrink cementitious grout.
4. Rapid-curing epoxy grout.

B. Related Requirements:

1. Section 030130.71 “Modifications to Existing Concrete.”
2. Section 033010 “Miscellaneous Cast-in-Place Concrete.”
3. Section 042200 “Concrete Unit Masonry” for masonry grout.
4. Section 055000 “Metal Fabrications” for grout related to miscellaneous metals.

1.3 ACTION SUBMITTALS

A. Product Data: Submit manufacturer information regarding grout and surface preparation, mixing and installation.

1. Commercially Manufactured Nonshrink Cementitious Grout: Include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, and conformity to specified ASTM standards.
2. Commercially Manufactured Nonshrink Epoxy Grout: Include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, and conformity to specified ASTM standards.
3. Cement Grout: Include type and brand of cement, gradation of fine aggregate, product data on any proposed admixtures, and proposed grout mix.
4. Concrete grout. Include data as required for concrete and for fiber reinforcement as delineated in Section 033010 “Miscellaneous Cast-In-Place Concrete.”

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

B. Manufacturer Instructions: Submit instructions for mixing, handling, surface preparation, and placing epoxy-type and nonshrink grouts.

C. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

D. Qualifications Statement:

1. Submit qualifications for manufacturer.

E. Product Certificates: Provide certification of the following:

1. Manufactured grout products and admixtures for cement grout and concrete grout are made for use in contact with potable water 30 days after installation (non-toxic and free of taste and odor).

1.5 SUSTAINABLE DESIGN SUBMITTALS

A. Manufacturer's Certificate:

1. Certify that products meet or exceed specified sustainable design requirements.
2. Materials Resources Certificates:

a. Certify recycled material content for recycled content products.
b. Certify source for regional materials and distance from Project Site.

B. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.

1. Provide cost data for following products:

a. Products with recycled material content.
b. Regional products.

1.6 QUALITY ASSURANCE

A. Perform Work according to City of Redlands standards.

B. Maintain one copy of each standard affecting Work of this Section on Site.

C. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum ten years' experience in production and use of provided grouts.

D. Independent testing laboratory meets requirements of ASTM E329 and ASTM C1077 and be acceptable to Engineer. Laboratories affiliated with Contractor or in which Contractor or officers of Contractor's organization have beneficial interest are not acceptable.

E. Pre-installation Meeting: At least ten working days before grouting, hold a pre-installation meeting to review the requirements for surface preparation, mixing, placing, and curing procedures for each product proposed for use. Notify all parties involved with grouting, including Engineer, of the meeting at least ten working days prior to its scheduled date.

F. Services of Manufacturer's Representative: Provide services of a field technician of nonshrink grout manufacturer epoxy grout manufacturer who has performed at least five projects of similar size and complexity during last five years, to attend pre-installation meeting, to be present for initial installation of each type of nonshrink and epoxy grout, and to correct installation problems.

G. Field Testing:

1. All field testing and inspection services will be provided by Owner. Assist in the sampling of materials and cooperate by allowing free access to the work and permitting use of ladders, scaffolding, and such incidental equipment as may be required. Methods of testing will comply with applicable ASTM Standards.

H. Field testing of concrete grout will be as specified for concrete in Section 033010 “Miscellaneous Cast-In-Place Concrete.”

1.7 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Store materials according to manufacturer instructions. Limit total storage time from date of manufacture to date of installation to six months or manufacturer’s recommended storage time, whichever is less.

C. Remove immediately from the site material which becomes damp, contains lumps, or is hardened and replace with acceptable material.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location.
2. Provide additional protection according to manufacturer instructions.

1.8 AMBIENT CONDITIONS

A. Maximum Conditions: Do not perform grouting if temperatures exceed 90 degrees F.

B. Minimum Conditions: Do not perform grouting if the minimum temperature of base plates, supporting concrete and grout are less than 40 degrees F. Maintain minimum temperature of 40 degrees F before, during, and after grouting, until grout has set.

PART 2 - PRODUCTS

2.1 CEMENT GROUT

A. Cement: Portland cement complying with ASTM C150/C150M, Type I and II.

B. Water:

1. Potable.
2. No impurities, suspended particles, algae, or dissolved natural salts in quantities capable of causing:

a. Corrosion of steel.
b. Volume change increasing shrinkage cracking.
c. Efflorescence.
d. Excess air entraining.

C. Fine Aggregate:

1. Washed natural sand.
2. Gradation:

a. Comply with ASTM C33/C33M.
b. Represented by smooth granulometric curve within required limits.

3. Free from injurious amounts of organic impurities according to ASTM C40/C40M.

D. Mix:

1. Portland cement, sand, and water.
2. Do not use ferrous aggregate or staining ingredients in grout mixes.
3. 28-day Strength: 2,500 psi.

2.2 NONSHRINK CEMENTITIOUS GROUT

A. Description:

1. Pre-mixed and ready-for-use formulation requiring only addition of water.
2. Nonshrink, non-corrosive, nonmetallic, non-gas forming, not containing expansive cement and no chlorides.
3. No shrinkage when tested in conformity with ASTM C827/C827M.
4. For placements 3 inches and thicker, extend nonshrink cementitious grout with 3/8-inch aggregate in accordance with manufacturer's recommendations.

B. Performance and Design Criteria:

1. Certified to maintain initial placement volume or expand after set, and to meet following minimum properties when tested according to ASTM C1107/C1107M for Grades B, C, D and CRD-C621 nonshrink grout:

a. Setting Time:

1) Initial: Approximately two hours.
2) Final: Approximately three hours.
3) Comply with ASTM C191.

b. Maximum Expansion: 0.10 to 0.40 percent.

c. Minimum Compressive Strength:

1) One-Day: 4,000 psi.
2) Seven-Day: 7,000 psi.
3) 28-Day: 10,000 to 10,800 psi.
4) Comply with CRD-C621.

2.3 FORMWORK

A. As specified in this Section and in Section 033010 “Miscellaneous Cast-in-Place Concrete.” Provide forms that are liquid-tight, anchored in place, and shored to resist the forces imposed by the grout and its placement.

B. Provide form release agent as recommended by the grout manufacturer. For cement grout and concrete grouts, provide water-based form release agents.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify areas to receive grout.

3.2 PREPARATION

A. Place grout where indicated or specified over existing concrete and cured concrete which has attained its specified design strength unless otherwise approved by Engineer.

B. Remove defective concrete, ice, laitance, dirt, oil, grease, form release agents, paints, and other foreign material from concrete surfaces, which may affect the bond or performance of the grout by brushing, hammering, chipping, sand blasting or other similar dry mechanical means until sound and clean concrete surface is achieved. Irregular voids or projecting coarse aggregate need not be removed if they are sound, free of laitance and firmly embedded into the parent concrete.

1. Ensure air compressors used to clean surfaces in contact with grout are oil-less type or equipped with an oil trap in the airline to prevent oil from being blown onto the surface.

C. Roughen concrete lightly, but not to interfere with placement of grout.

D. Remove foreign materials from metal surfaces in contact with grout.

E. Align, level, and maintain final positioning of components to be grouted.

F. Wash concrete surfaces clean and then keep moist for at least 24 hours prior to the placement of nonshrink cementitious or cement grout. Saturation may be achieved by covering the concrete with saturated burlap bags, use of a soaker hose, or flooding the surface or other method acceptable to Engineer. Upon completion of the 24 hour period, remove visible water from the surface prior to grouting.

G. Nonshrink epoxy grouts do not require saturation of concrete substrate. Do not wet concrete surfaces to receive nonshrink epoxy grout. Completely dry surfaces in contact with epoxy grout before grouting.

H. Support equipment during alignment and installation of grout by shims, wedges, blocks, or other approved means. Prevent bond of shims, wedges and blocking devices by bond breaking coatings and remove after grouting unless otherwise approved by Engineer. Grout voids created by the removal of shims, wedges, and blocks.

I. Formwork:

1. Construct leakproof forms anchored and shored to withstand grout pressures.
2. Install formwork with clearances to permit proper placement of grout.

3.3 INSTALLATION – GENERAL

A. Mix, apply and cure products in strict compliance with the manufacturer's recommendations and these Specifications.

B. Provide staffing and equipment available for rapid and continuous mixing and placing. Keep all necessary tools and materials ready and close at hand.

C. Maintain temperatures of base plate, supporting concrete, and grout between 40 and 90 degrees F during grouting and for at least 24 hours after placement, until grout compressive strength reaches 1,000 psi or as recommended by grout manufacturer, whichever is longer. Do not allow differential heating or cooling of baseplates and grout during the curing period.

D. Take special precautions for hot weather or cold weather grouting as recommended by manufacturer when ambient temperatures and/or temperature of materials in contact with the grout are outside of 40 to 90 degrees F range.

E. Install grout to preserve the isolation between elements on either side of the joint where grout is placed in the vicinity of an expansion or partial contraction joint.

F. Reflect all existing underlying expansion, partial contraction and construction joints through the grout.

3.4 INSTALLATION – CEMENT GROUT

A. Mixing:

1. Use proportions of two parts sand and one part cement, measured by volume.
2. Prepare grout with water to obtain consistency to permit placing and packing.
3. Mix water and grout in two steps:

    a. Premix using approximately 2/3 of water.
    b. After partial mixing, add remaining water to bring mix to desired placement consistency and continue mixing two to three minutes.

4. Mix only quantities of grout capable of being placed within 30 minutes after mixing.

5. Do not add additional water after grout has been mixed.
6. Minimum Compressive Strength (ASTM C 579):

    a. In 48 hours: 2,400 psi.
    b. In 28 days 7,000 psi.

B. Placing:

1. Place grout material quickly and continuously.
2. Do not use pneumatic-pressure or dry-packing methods.
3. Apply grout from one side only to avoid entrapping air.
4. Do not vibrate placed grout mixture or permit placement if area is being vibrated by nearby equipment.
5. Thoroughly compact final installation and eliminate air pockets.
6. Do not remove leveling shims for at least 48 hours after grout has been placed.

C. Curing:

1. Prevent rapid loss of water from grout during first 48 hours by use of approved membrane curing compound or by using wet burlap bags, soaker hoses or ponding.
2. Immediately after placement, protect grout from premature drying, excessively hot or cold temperatures, and mechanical injury.
3. After grout has attained its initial set, keep damp for minimum three days.

D. Reflect existing underlying expansion joints, partial contraction joints, and construction joints through the grout.

3.5 INSTALLATION – NONSHRINK CEMENTITIOUS GROUTS

A. Mix in accordance with manufacturer's recommendations. Do not add cement, sand, pea gravel or admixtures without prior approval by Engineer.

B. Mix in a mortar mixer with moving blades. Pre-wet mixer and empty excess water. Add pre-measured amount of water for mixing, followed by the grout. Begin with minimum amount of water recommended by manufacturer and then add minimum additional water required to obtain workability. Do not exceed manufacturer's maximum recommended water content. Do not mix by hand.

C. Provide forms as specified in “Preparation” Article. Place grout into the designated areas and prevent segregation and entrapment of air. Do not vibrate grout to release air or to consolidate the material. Fill all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes and vent holes as necessary.

D. Place grout rapidly and continuously to avoid cold joints. Do not place grout in layers. Do not add additional water to the mix (retemper) after initial stiffening.

E. Just before grout reaches its final set, cut back grout to the substrate at a 45-degree angle from lower edge of bearing plate unless otherwise ordered and approved by Engineer. Finish this surface with a wood float or brush finish.

F. Begin curing immediately after form removal, cutback, and finishing. Keep grout moist and within its recommended placement temperature range for at least 24 hours after placement, until grout compressive strength reaches 1,000 psi or as recommended by manufacturer, whichever is longer. Saturate grout surface by use of saturated burlap bags, soaker hoses or ponding. Provide sunshades. If drying winds inhibit the ability of a given curing method to keep grout moist, erect wind breaks until wind is no longer a problem or curing is finished.

3.6 SCHEDULE

A. Use particular types of grout as follows:

1. Cement Grout: Use where indicated.
2. General Purpose Nonshrink Cementitious Grout (CRD-C621 Grade D): Use at locations where nonshrink grout is indicated, except for base plates greater in area than 3-feet wide by 3-feet long.
3. Flowable (precision) Nonshrink Cementitious Grout (CRD-C621 Grade B or C): Use under base plates greater in area than 3-feet wide by 3-feet. Use at locations indicated to receive flowable (precision) nonshrink grout. Flowable (precision), nonshrink, cementitious grout may be substituted for general purpose nonshrink cementitious grout.

END OF SECTION 036000

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SECTION 040110 - MASONRY CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes cleaning the following:

1. Unit masonry surfaces.

1.3 DEFINITIONS

A. Very Low-Pressure Spray: Under 100 psi.

B. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm.

C. Medium-Pressure Spray: 400 to 800 psi; 4 to 6 gpm.

D. High-Pressure Spray: 800 to 1200 psi; 4 to 6 gpm.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to cleaning masonry including, but not limited to, the following:

a. Verify masonry-cleaning equipment and facilities needed to make progress and avoid delays.
b. Materials, material application, and sequencing.
c. Cleaning program.
d. Coordination with building occupants.

1.5 SEQUENCING AND SCHEDULING

A. Work Sequence: Perform masonry-cleaning work in the following sequence:

1. Remove plant growth.

2. Inspect for open mortar joints. Where repairs are required, delay further cleaning work until after repairs are completed, cured, and dried to prevent the intrusion of water and other cleaning materials into the wall.
3. Remove paint.
4. Clean masonry surfaces.
5. Where water repellents are to be used on or near masonry, delay application of these chemicals until after cleaning.

B. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in masonry units according to masonry repair Sections. Patch holes in mortar joints according to masonry repointing Sections.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include material descriptions and application instructions.
2. Include test data substantiating that products comply with requirements.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For paint-remover manufacturer and chemical-cleaner manufacturer.

B. Preconstruction Test Reports: For cleaning materials and methods.

C. Cleaning program.

1.8 QUALITY ASSURANCE

A. Paint-Remover Manufacturer Qualifications: A firm regularly engaged in producing masonry cleaners that have been used for similar applications with successful results, and with factory-authorized service representatives who are available for consultation and Project-site inspection, preconstruction product testing, and on-site assistance.

B. Chemical-Cleaner Manufacturer Qualifications: A firm regularly engaged in producing masonry cleaners that have been used for similar applications with successful results, and with factory-authorized service representatives who are available for consultation and Project-site inspection, preconstruction product testing, and on-site assistance.

C. Cleaning Program: Prepare a written cleaning program that describes cleaning process in detail, including materials, methods, and equipment to be used; protection of surrounding materials; and control of runoff during operations. Include provisions for supervising worker performance and preventing damage.

1. If materials and methods other than those indicated are proposed for any phase of cleaning work, add a written description of such materials and methods, including evidence of successful use on comparable projects and demonstrations to show their effectiveness for this Project.

D. Mockups: Prepare mockups of cleaning on existing surfaces to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Cleaning: Clean an area approximately 25 sq. ft. for each type of masonry and surface condition.

a. Test cleaners and methods on samples of adjacent materials for possible adverse reactions. Do not test cleaners and methods known to have deleterious effect.
b. Allow a waiting period of not less than seven days after completion of sample cleaning to permit a study of sample panels for negative reactions.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Engineer specifically approves such deviations in writing.

1.9 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage one or more chemical-cleaner manufacturers to perform preconstruction testing on masonry surfaces.

1. Use test areas as indicated and representative of proposed materials and existing construction.
2. Propose changes to materials and methods to suit Project.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit masonry-cleaning work to be performed according to product manufacturers' written instructions and specified requirements.

B. Clean masonry surfaces only when air temperature is 40 deg F and above and is predicted to remain so for at least seven days after completion of cleaning.

PART 2 - PRODUCTS

2.1 PAINT REMOVERS

A. Alkaline Paste Paint Remover: Manufacturer's standard alkaline paste or gel formulation, for removing paint from masonry; containing no methylene chloride.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Building Restoration Products, Inc.
b. Cathedral Stone Products, Inc.
c. Diedrich Technologies, Inc.; a Hohmann & Barnard company.
d. EaCo Chem, Inc.

e. Hydroclean; Hydrochemical Techniques, Inc.
f. Shore Corporation.

2.2 CLEANING MATERIALS

A. Water: Potable.

B. Hot Water: Water heated to a temperature of 140 to 160 deg F.

C. Nonacidic Liquid Cleaner: Manufacturer's standard mildly alkaline liquid cleaner formulated for removing mold, mildew, and other organic soiling from ordinary building materials, including polished stone, brick, aluminum, plastics, and wood.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Building Restoration Products, Inc.
b. Cathedral Stone Products, Inc.
c. Diedrich Technologies, Inc.; a Hohmann & Barnard company.
d. Dumond Chemicals, Inc.
e. Hydroclean; Hydrochemical Techniques, Inc.
f. Price Research, Ltd. dba Charles Paint Research.

2.3 ACCESSORY MATERIALS

A. Liquid Strippable Masking Agent: Manufacturer's standard liquid, film-forming, strippable masking material for protecting glass, metal, glazed masonry, and polished stone surfaces from damaging effects of acidic and alkaline masonry cleaners.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Building Restoration Products, Inc.
b. Price Research, Ltd. dba Charles Paint Research.

2.4 CHEMICAL CLEANING SOLUTIONS

A. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended in writing by chemical-cleaner manufacturer.

B. Acidic Cleaner Solution for Nonglazed Masonry: Dilute acidic cleaner with water to produce hydrofluoric acid content of 3 percent or less, but not greater than that recommended in writing by chemical-cleaner manufacturer.

C. Acidic Cleaner for Nonglazed Masonry: Dilute acidic cleaner with water to concentration demonstrated by testing that does not etch or otherwise damage glazed or polished surface, but not greater than that recommended in writing by chemical-cleaner manufacturer.

PART 3 - EXECUTION

3.1 PROTECTION

A. Comply with each manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent paint removers and chemical cleaning solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.

1. Cover adjacent surfaces with materials that are proven to resist paint removers and chemical cleaners used unless products being used will not damage adjacent surfaces. Use protective materials that are waterproof and UV resistant. Apply masking agents according to manufacturer's written instructions. Do not apply liquid strippable masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
2. Do not apply chemical solutions during winds of enough force to spread them to unprotected surfaces.
3. Neutralize alkaline and acid wastes before disposal.
4. Dispose of runoff from operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

B. Remove downspouts and associated hardware adjacent to immediate work area and store during masonry cleaning. Reinstall when masonry cleaning is complete.

1. Provide temporary rain drainage during work to direct water away from building.

3.2 CLEANING MASONRY, GENERAL

A. Cleaning Appearance Standard: Cleaned surfaces are to have a uniform appearance as viewed from 50 feet away by Engineer.

B. Proceed with cleaning in an orderly manner; work from top to bottom of each scaffold width and from one end of each elevation to the other. Ensure that dirty residues and rinse water do not wash over dry, cleaned surfaces.

C. Use only those cleaning methods indicated for each masonry material and location.

1. Brushes: Do not use wire brushes or brushes that are not resistant to chemical cleaner being used.
2. Spray Equipment: Use spray equipment that provides controlled application at volume and pressure indicated, measured at nozzle. Adjust pressure and volume to ensure that cleaning methods do not damage surfaces, including joints.

a. Equip units with pressure gages.
b. For chemical-cleaner spray application, use low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with nozzle having a cone-shaped spray.

c. For water-spray application, use fan-shaped spray that disperses water at an angle of 25 to 50 degrees.
d. For high-pressure water-spray application, use fan-shaped spray that disperses water at an angle of at least 40 degrees.
e. For heated water-spray application, use equipment capable of maintaining temperature between 140 and 160 deg F at flow rates indicated.
f. For steam application, use steam generator capable of delivering live steam at nozzle.

D. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces. Keep wall wet below area being cleaned to prevent streaking from runoff.

E. Perform additional general cleaning, paint and stain removal, and spot cleaning of small areas that are noticeably different when viewed according to the "Cleaning Appearance Standard" Paragraph, so that cleaned surfaces blend smoothly into surrounding areas.

F. Water Application Methods:

1. Water-Spray Applications: Unless otherwise indicated, hold spray nozzle at least 6 inches from masonry surface and apply water in horizontal back-and-forth sweeping motion, overlapping previous strokes to produce uniform coverage.

G. Chemical-Cleaner Application Methods: Apply chemical cleaners to masonry surfaces according to chemical-cleaner manufacturer's written instructions; use brush or spray application. Do not spray apply at pressures exceeding 50 psi. Do not allow chemicals to remain on surface for periods longer than those indicated or recommended in writing by manufacturer.

H. Rinse off chemical residue and soil by working upward from bottom to top of each treated area at each stage or scaffold setting. Periodically during each rinse, test pH of rinse water running off of cleaned area to determine that chemical cleaner is completely removed.

1. Apply neutralizing agent and repeat rinse if necessary to produce tested pH of between 6.7 and 7.5.

I. After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.

3.3 PRELIMINARY CLEANING

A. Removing Plant Growth: Completely remove visible plant, moss, and shrub growth from masonry surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing remaining growth to dry as long as possible before removal. Remove loose soil and plant debris from open joints to whatever depth they occur.

B. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to planned cleaning methods. Extraneous substances include paint, calking, asphalt, and tar.

1. Carefully remove heavy accumulations of rigid materials from masonry surface with sharp chisel. Do not scratch or chip masonry surface.
2. Remove paint and calking with paint remover.

    a. Comply with requirements in "Paint Removal" Article.
    b. Repeat application up to two times if needed.

3. Remove asphalt and tar with solvent-type paste paint remover.

    a. Comply with requirements in "Paint Removal" Article.
    b. Apply paint remover only to asphalt and tar by brush without prewetting.
    c. Allow paint remover to remain on surface for 10 to 30 minutes.
    d. Repeat application if needed.

3.4 CLEANING MASONRY

A. Hot-Water Wash: Use hot water applied by low-pressure spray.

B. Mold, Mildew, and Algae Removal:

1. Wet surface with hot water applied by low-pressure spray.
2. Apply mold, mildew, and algae remover by brush or low-pressure spray.
3. Scrub surface with medium-soft brushes until mold, mildew, and algae are thoroughly dislodged and can be removed by rinsing. Use small brushes for mortar joints and crevices. Dip brush in mold, mildew, and algae remover often to ensure that adequate fresh cleaner is used and that surface remains wet.
4. Rinse with hot water applied by low-pressure spray to remove mold, mildew, and algae remover and soil.
5. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

C. Nonacidic Liquid Chemical Cleaning:

1. Wet surface with hot water applied by low-pressure spray.
2. Apply cleaner to surface in two applications by brush or low-pressure spray.
3. Let cleaner remain on surface for period recommended in writing by chemical-cleaner manufacturer.
4. Rinse with hot water applied by low-pressure spray to remove chemicals and soil.
5. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage paint-remover manufacturer's and chemical-cleaner manufacturer's factory-authorized service representatives for consultation and Project-site inspection, to perform preconstruction product testing, and provide on-site assistance when requested by Engineer. Have chemical-cleaner manufacturer's factory-authorized service

representatives visit Project site not less than twice to observing progress and quality of the work.

3.6 FINAL CLEANING

A. Clean adjacent nonmasonry surfaces of spillage and debris. Use detergent and soft brushes or cloths.

B. Remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

C. Remove masking materials, leaving no residues that could trap dirt.

END OF SECTION 040110

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SECTION 042200 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Mortar and grout materials.
3. Reinforcement.
4. Masonry-joint reinforcement.
5. Embedded flashing materials.
6. Miscellaneous masonry accessories.

B. Products Installed, but Not Furnished, under This Section:

1. Steel lintels and steel shelf angles in accordance with Section 055000 "Metal Fabrications" in concrete unit masonry.

C. Related Requirements:

1. Section 071900 "Water Repellents" for water repellents applied to surface of unit masonry assemblies.

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

C. Exposed: Weather-exposed side of a constructed wall.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
3. Lintel design and types required.
4. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

C. Samples for Initial Selection:

1. Smooth and Split-faced CMUs, in the form of small-scale units.
2. Pre-faced CMUs.
3. Colored mortar.
4. Weep holes/vents.

D. Samples for Verification: For each type and color of the following:

1. Exposed CMUs.
2. Pre-faced CMUs.
3. Pigmented and colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Material Certificates: For each type and size of the following:

1. Masonry units.

a. Include data on material properties, material test reports substantiating compliance with requirements.
b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.

2. Integral water repellent used in CMUs, if not surface treated.
3. Cementitious materials. Include name of manufacturer, brand name, and type.
4. Mortar admixtures.
5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
6. Grout mixes. Include description of type and proportions of ingredients.
7. Reinforcing bars.
8. Joint reinforcement.
9. Anchors, ties, and metal accessories.

C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test in accordance with ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
2. Include test reports, in accordance with ASTM C1019, for grout mixes required to comply with compressive strength requirement.

D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined in accordance with TMS 402/602.

E. Weather Procedures:

1. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.
2. Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

A. Project team craftworkers of the Masonry Contractor assigned to Project will be required to have the International Masonry Institute - Flashing Training or equal and to provide evidence of certificate or a letter of the firm's commitment to enroll key project personnel in the training program prior to the start of Project.

B. Project team craftworkers of the Masonry Contractor assigned to Project will be required to have the International Masonry Institute - Grouting and Reinforcing Training or equal and to provide evidence of certificate or a letter of the firm's commitment to enroll key project personnel in the training program prior to the start of Project.

C. Testing Agency Qualifications: Qualified in accordance with ASTM C1093 for testing indicated.

D. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects.

1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 48 inches long by 48 inches high by full thickness.
2. Build sample panels facing south.
3. Where masonry is to match existing, build panels adjacent and parallel to existing surface.
4. Protect approved sample panels from the elements with weather-resistant membrane.
5. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Engineer in writing.

    a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless Engineer specifically approves such deviations in writing.

1.8 MOCKUPS

A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockup of typical wall area as indicated on Drawings.
2. Build mockups for each type of exposed unit masonry construction in sizes approximately 72 inches long by 72 inches high by full thickness, including face and backup wythes and accessories.

    a. Include a sealant-filled joint at least 16 inches long in exterior wall mockup.
    b. Include lower corner of window opening at upper corner of exterior wall mockup. Make opening approximately 12 inches wide by 16 inches high.
    c. Include through-wall flashing installed for a 24-inch length in corner of exterior wall mockup approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).

3. Protect accepted mockups from the elements with weather-resistant membrane.
4. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.

    a. Approval of mockups is also for other material and construction qualities specifically approved by Engineer in writing.
    b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Engineer specifically approves such deviations in writing.

5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.10 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 402/602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 402/602.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

C. Source Limitations for Integral Water Repellent: Obtain integral water-repellent units from CMU and mortar manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry by testing masonry prisms accordance with ASTM C1314.

B. Regulatory Requirements: Comply with the provisions of the following codes, specifications, and standards, except as otherwise shown or specified:

1. TMS 402/602:

a. Maintain one copy of the standard in Project field office at all times during construction. Supervisory personnel are to be thoroughly familiar with this material as it applies to Project.

2.3 CONCRETE UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 402/602 except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 ft. vertically and horizontally of a walking surface.

C. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide square-edged units for outside corners unless otherwise indicated.

D. Building Lintels:

1. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout.

a. Knockout blocks will not be acceptable.

E. Integral Water Repellent: Surface-applied water repellent for exposed units.

1. Description: Liquid polymeric, water-repellent admixture that does not reduce flexural bond strength. Units made with water repellent, when tested in accordance with

ASTM E514/E514M as a wall assembly made with mortar containing water-repellent manufacturer's mortar additive, with test period extended to 24 hours, show no visible water or leaks on the back of test specimen.

2.4 CONCRETE MASONRY UNITS

A. Standard CMUs: Load-bearing ASTM C90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2000 psi.
2. Density Classification: Medium weight.
3. Size (Width): Manufactured to dimensions 3/8 inch less-than-nominal dimensions.
4. Exposed Faces: Provide color and texture matching the range represented by Engineer's sample.

B. Architectural CMUs: Load bearing, ASTM C90.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. York Building Products or equal.

2. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 200 psi.
3. Density Classification: Medium weight.
4. Size (Width): Manufactured to dimensions 3/8 inch less-than-nominal dimensions.
5. Pattern and Texture: To match existing adjacent.
6. Colors: To match existing adjacent.
7. Special Aggregate: Provide units made with aggregate matching aggregate in Engineer's sample.

2.5 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or II. Provide natural color or white cement as required to produce mortar color indicated.

1. Alkali content is not more than 0.1 percent when tested in accordance with ASTM C114.

B. Hydrated Lime: ASTM C207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C91/C91M.

E. Mortar Cement : ASTM C1329/C1329M.

F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in masonry mortar.

G. Colored Cement Products: Packaged blend made from portland cement and hydrated lime masonry cement or mortar cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Colored Portland Cement-Lime Mix:
2. Colored Masonry Cement:
3. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
4. Pigments does not exceed 10 percent of portland cement by weight.
5. Pigments does not exceed 5 percent of masonry cement or mortar cement by weight.

H. Aggregate for Mortar: ASTM C144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

I. Aggregate for Grout: ASTM C404.

J. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

K. Water-Repellent Mortar Admixture: Liquid water-repellent admixture added to mortar, intended for use with CMUs containing integral water repellent from same manufacturer.

L. Water: Potable.

2.6 REINFORCEMENT

A. Uncoated-Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60.

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

2.7 TIES AND ANCHORS

A. General: Ties and anchors extend at least 1-1/2 inches into masonry but with at least a 5/8-inch cover on outside face.

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Mill-Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A641/A641M, Class 1 coating.
2. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A153/A153M, Class B-2 coating.
3. Stainless Steel Wire: ASTM A580/A580M, Type 304.
4. Galvanized-Steel Sheet: ASTM A653/A653M, Commercial Steel, G60 zinc coating.
5. Steel Sheet, Galvanized after Fabrication: ASTM A1008/A1008M commercial steel, with ASTM A153/A153M, Class B coating.
6. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.
7. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch-diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.
2. Tie Section: Triangular-shaped wire tie made from 0.25-inch- diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.

D. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.060-inch-thick steel sheet, galvanized after fabrication.

    a. 0.064-inch- thick, galvanized-steel sheet may be used at interior walls unless otherwise indicated.

2. Tie Section: Triangular-shaped wire tie made from 0.25-inch- diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.

E. Partition Top Anchors: 0.105-inch-thick metal plate with a 3/8-inch-diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

F. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.

1. Corrosion Protection: Hot-dip galvanized to comply with ASTMA 153/A153M.

2.8 EMBEDDED FLASHING MATERIALS

A. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from UV-resistant, high-density polyethylene. Cell flashing pans have integral weep spouts designed to be built into mortar bed joints and that extend into the cell to prevent clogging with mortar.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from urethane.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 or PVC, complying with ASTM D2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

D. Masonry Cleaners:

1. Proprietary Acidic Masonry Cleaner: Manufacturer's standard-strength, general-purpose cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from masonry surfaces of type indicated below without discoloring or damaging masonry surfaces; expressly approved for intended use by manufacturer of masonry units being cleaned.

2.10 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime or mortar cement mortar unless otherwise indicated.
3. For exterior masonry, use portland cement-lime or mortar cement mortar.
4. For reinforced masonry, use portland cement-lime mortar cement mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated.

1. For masonry below grade or in contact with earth, use Type S.
2. For reinforced masonry, use Type S.
3. For mortar parge coats, use Type S.
4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type S.

D. Pigmented Mortar: Use colored cement product.

1. Pigments does not exceed 10 percent of portland cement by weight.
2. Pigments does not exceed 5 percent of mortar cement by weight.
3. Mix to match Engineer's sample.
4. Application: Use pigmented mortar for exposed mortar joints with the following units:

    a. Architectural CMUs.
    b. Pre-faced CMUs.
    c. Acoustical CMUs.

E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.

1. Mix to match Engineer's sample.
2. Application: Use colored-aggregate mortar for exposed mortar joints with the following units:

    a. Architectural CMUs.
    b. Pre-faced CMUs.
    c. Acoustical CMUs.

F. Grout for Unit Masonry: Comply with ASTM C476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 402/602 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2500 psi.
3. Provide grout with a slump of 8 to 11 inches as measured in accordance with ASTM C143/C143M.
4. Minimum W/C ratio = 0.60.

G. Epoxy Pointing Mortar: Mix epoxy pointing mortar to comply with mortar manufacturer's written instructions.

1. Application: Use epoxy pointing mortar for exposed mortar joints with pre-faced CMUs.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.
4. Verify that substrates are free of substances that would impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Build chases and recesses to accommodate items specified in this and other Sections.

B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

D. Exposed Masonry: Mix units to product uniform blend of colors and textures.

E. Where existing masonry occurs, match coursing, bonding, color, and texture of existing masonry.

F. Temperature Control: Perform temperature-sensitive construction procedures while masonry Work is progressing. Temperature ranges indicated below apply to air temperatures existing at time of installation except for grout. For grout, temperature ranges apply to anticipated minimum night temperatures. In heating mortar and grout materials, maintain mixing temperature selected within 10 deg F.

1. 40 to 32 Deg F (4 to 0 Deg C):

    a. Mortar: Heat mixing water to produce mortar temperature between 40 and 120 deg F.
    b. Grout: Follow normal masonry procedures.

2. 32 to 25 Deg F (0 to Minus 4 Deg C):

    a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F; maintain temperature of mortar on boards above freezing.
    b. Grout: Heat grout materials to 90 deg F to produce in-place grout temperature of 70 deg F at end of workday.

3. Do not heat water for mortar and grout to above 160 deg F.

G. Masonry Protection: Protect completed masonry and masonry not being worked on in the following manner. Temperature ranges indicated apply to mean daily air temperatures except for grouted masonry. For grouted masonry, temperature ranges apply to anticipated minimum night temperatures.

1. 40 to 32 Deg F (4 to 0 Deg C): Protect masonry from rain or snow for at least 24 hours by covering with weather-resistive membrane.

2. 32 to 25 Deg F (0 to Minus 4 Deg C): Completely cover masonry with weather-resistive membrane for at least 24 hours.
3. 25 to 20 Deg F (Minus 4 to 7 Deg C): Completely cover masonry with weather-resistive insulating blankets or similar protection for at least 24 hours, 48 hours for grouted masonry.
4. 20 Deg F (Minus 7 Deg C) and Below: Except as otherwise indicated, maintain masonry temperature above 32 deg F (0 deg C) for 24 hours using enclosures and supplementary heat, electric heating blankets, infrared lamps or other methods proven to be satisfactory. For grouted masonry, maintain heated enclosure to 40 deg F for 48 hours.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 ft., or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 ft., 1/4 inch in 20 ft., or 1/2 inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 ft., 3/8 inch in 20 ft., or 1/2 inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 ft., 1/4 inch in 20 ft., or 1/2 inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 ft., 3/8 inch in 20 ft., or 1/2 inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 ft. or 1/2 inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in bond pattern indicated on Drawings; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.
2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
3. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
4. Joint Sealants: Comply with ASTM C1193 for use of joint sealants, including acoustic sealants as applicable to materials, applications and Project conditions.
5. Penetration Firestopping: Install penetration firestopping systems for Project applications to comply with manufacturer's written installation instructions.

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.

B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Where applicable, set masonry trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Wet joint surfaces thoroughly before applying mortar.
3. Rake out mortar joints for pointing with sealant.

D. Rake out mortar joints at pre-faced CMUs to a uniform depth of 1/4 inch and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.

E. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

F. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

G. Cut joints flush where indicated to receive waterproofing unless otherwise indicated.

3.6 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 24 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

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3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:

1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.8 CONTROL JOINTS

A. General: Install control joint materials in CMUs as masonry progresses. Do not allow materials to span control joints without provision to allow for in-plane wall or partition movement.

B. Locate control joints. See Drawings.

C. Form control joints in CMUs as follows:

1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
2. Install preformed control joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

3.9 LINTELS

A. Install lintels over openings as indicated.

B. Provide concrete or formed-in-place masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

C. Install loose steel over openings as follows:

1. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

D. Lintels at Fire-Rated Openings: Provide fire-rated masonry required or steel lintels with applied fireproofing in thickness required to maintain fire rating of wall or partition rating.

3.10 FLASHING

A. General: Install embedded flashing at ledges and other obstructions to downward flow of water in wall where indicated.

B. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

3.11 REINFORCED UNIT MASONRY

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 402/602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 402/602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 48 inches.

3.12 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements is done at Contractor's expense.

B. Inspections: Refer to structural Drawings.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces, grades, sizes, and locations of reinforcement.

3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, in accordance with ASTM C140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, in accordance with ASTM C780.

G. Mortar Test (Property Specification): For each mix provided, in accordance with ASTM C780. Test mortar for mortar air content and compressive strength.

H. Grout Test (Compressive Strength): For each mix provided, in accordance with ASTM C1019.

I. Prism Test: For each type of construction provided, in accordance with ASTM C1314 at 7 days and at 28 days.

3.13 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as Work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Engineer's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid-strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 08-04A.

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3.14 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches in each dimension.
2. Mix masonry waste with at least 2 parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
3. Do not dispose of masonry waste as fill within 18 inches of finished grade.

C. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

D. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042200

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Division 05

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SECTION 050519 - POST-INSTALLED ANCHORS AND REINFORCING BARS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Post-installed adhesive and expansion anchors for concrete and concrete masonry unit substrates.
2. Post-installed reinforcing bar dowels using adhesive anchoring system.

B. Related Requirements:

1. Section 033010 “Miscellaneous Cast-in-Place Concrete” and related Sections for concrete, reinforcement, and accessories.
2. Section 042200 “Concrete Unit Masonry” for concrete masonry units and accessories.
3. Various Sections in Division 05 related to metals.
4. Various Sections in Divisions 21, 22, 23, 25, 26, 27, and 28 related to facility utilities.
5. Various Sections in Divisions 40, 41, 43, 44, and 46 related to process mechanical equipment.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to post-installed anchors including, but not limited to, the following:

a. Verify specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
b. Materials, material application, sequencing, tolerances, and required clearances.
c. Temperature, humidity & moisture limitations for adhesive anchoring system.
d. Manufacturer’s instructions for installation of expansion anchors and adhesive anchoring system.
e. Quality-control program.
f. Coordination with building occupants.

2. Attendees:

a. Owner or Owner’s Representative.
b. Resident Engineer.

c. Contractor.
d. Engineer.
e. Manufacturer Representative.

1.4 ACTION SUBMITTALS

A. Post-Installed Expansion Anchors:

1. Design Data: Submit manufacturer's specifications and data including recommended design values and physical characteristics for expansion anchors.
2. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, materials and finishes for post-installed expansion anchors installed into cracked concrete or masonry.
3. Installation Procedures: Submit procedures stating product proposed for use, and complete installation method.

B. Post-Installed Adhesive Anchoring System:

1. Design Data: Submit manufacturer's specifications and data including recommended design values and physical characteristics, including temperature, humidity, and moisture limitations for adhesive anchoring system.
2. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, materials and finishes for post-installed adhesive anchoring system installed into cracked concrete or masonry.
3. Installation Procedures: Submit procedures stating method of drilling, product proposed for use, and complete installation method.

1.5 INFORMATIONAL SUBMITTALS

A. Installation procedure: Submit installation procedure for post-installed adhesive anchoring system; including method of drilling.

B. Certificates:

1. Installer Qualifications for Adhesive Anchoring System: Submit installer and testing agency qualifications as stated in following Paragraph of this Article.
2. Submit current International Code Council (ICC) Evaluation Service Reports (ESR) or IAPMO-UES (ER) Report for expansion anchors and adhesive anchoring system, for installation into cracked concrete or masonry, as applicable, indicating conformance with current ICC Evaluation Service (ICC-ES) Acceptance Criteria.
3. City of Los Angeles Department of Building and Safety (LADBS) compliance for expansion anchors and adhesive anchoring system, for installation into cracked concrete or masonry, as applicable.
4. Seismic Qualification Certificates for Post-installed Concrete Anchors.

C. Qualification Data:

1. Installer: Indicate manufacturer's training date and a list of personnel trained on installation of adhesive anchoring system.

2. Testing Agency:

   a. Laboratory: Meet requirements of ASTM E329. Prior to testing, submit qualifications of proposed testing laboratory for approval that includes:

      1) Name and address.
      2) Names and positions of principal officers and name, position, and qualifications of responsible registered professional engineer in charge.
      3) List technical services provided, indicating external technical services to be provided by other organizations.
      4) Names and qualifications of the supervising laboratory technicians.
      5) Provide report prepared by laboratory evaluations authority when requested by Engineer.
      6) Submit as required above for other organizations that will provide external technical services.

   b. Include in submittal a list of five projects in which the testing agency has performed testing in accordance with ASTM E488. Include following information for each project:

      1) Project name and location.
      2) Project Owner.
      3) Owner's representative including address and phone number.
      4) Brief description of work.

3. Submit qualifications of other laboratory or laboratories until approved.

D. Evaluation Reports: From ICC-ES or IAPMO-UES for expansion anchors and adhesive anchoring system, for installation of post-installed anchors into cracked concrete or concrete masonry unit, as applicable, indicating conformance with current ICC ES Acceptance Criteria.

1.6 QUALITY ASSURANCE

A. General: Coordinate with the work of other Sections, field verifying dimensions and work of other trades adjoining items of work before installing items specified in this Section.

B. Adhesive Anchoring System:

1. Installer Training: Conduct thorough training by the manufacturer or the manufacturer's representative. Training shall consist of the complete installation process for post-installed anchors and reinforcing bar dowels, including but not limited to:

   a. Tool selection.
   b. Hole drilling procedure.
   c. Hole preparation and cleaning techniques.
   d. Adhesive injection technique and dispenser training and maintenance.
   e. Anchor preparation and installation.
   f. Reinforcing bar dowels preparation and installation.
   g. Proof loading and torqueing.
   h. Temperature, humidity, and moisture limitations.

i. Working time limitations.
j. Setting time.

2. Where indicated on plans include training for anchors and reinforcing bar dowels installed horizontally or upwardly inclined to support sustained tension loads. Install horizontally or upwardly inclined anchors and reinforcing bar dowels by personnel letter by an applicable training program. Certification shall include written and performance tests in accordance with the ACI/CRSI Adhesive Anchor Installer Certification program, or equivalent as preapproved by Engineer of Record.
3. Manufacturer's Certificate of Proper Training: Submit upon completion of training, for the post-installed anchors and reinforcing bar dowels, including non-production and production anchors, and reinforcing bar dowels.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver items to be incorporated into the work of other trades in sufficient time to be checked prior to installation.

B. Handle materials with cranes or derricks. Do not dump material off transportation vehicles or handle in ways that will cause damage.

C. Store materials elevated above grade and block up so they will not become bent or otherwise damaged.

D. Repair items that have become damage or corroded to satisfaction of Engineer prior to incorporating them into the work.

PART 2 - PRODUCTS

2.1 EXPANSION ANCHORS

A. Fastening to Concrete Substrate: Zinc plated carbon steel wedge type anchors, complete with zinc plated nuts and washers, unless otherwise noted.

B. Submerged or Weather Exposed Substrates: ASTM A276 Type 316 stainless steel wedge type anchors, complete with Type 316 stainless steel nuts and washers, unless otherwise noted.

C. Meet ICC ES AC01 or ICC ES AC193 cracked concrete qualifications.

D. Length: When length or anchor embedment is not indicated, provide length sufficient to place the wedge and expansion cone portion of the anchor at least 1 inch behind concrete reinforcing steel.

E. Basis-of-Design:

1. Anchorage designs indicated are based on Hilti, Kwik-Bolt TZ, unless otherwise noted.
2. Acceptable Anchors: Hilti Kwik-Bolt TZ; Simpson Strong-Tie Strong Bolt 2 Wedge Anchor; DeWalt Power-Stud+; or equal.

2.2 ADHESIVE ANCHORING SYSTEM

A. Fastening to Concrete Substrate: Manufactured system consisting of post installed threaded rods, nuts, washers, other anchoring hardware, and chemical dispenser for installation in hammer drilled holes.

1. Anchors: Meet ICC ES AC308 cracked concrete qualifications.
2. Injection Adhesive: Two-component epoxy system consisting of a hardener and a resin, furnished in pre-measured side-by-side cartridges which keep both components separate.
3. Adhesive Cartridge: Side-by-side design to accept a static mixing nozzle which thoroughly blends both components and allows injection directly into a drilled hole.
4. Anchor: Zinc plated carbon steel or Type 316 stainless steel as indicated consisting of an all-thread anchor rod with nut and washer, of matching material to anchor rod.

    a. Basis-of-Design:

        1) Anchorage designs indicated are based on Hilti HIT- RE 500 V3, unless otherwise noted.
        2) Acceptable Manufacturers: Hilti HIT- RE 500 V3; Simpson Strong Tie SET-3G; or equal.

5. Reinforcing Bar Dowels: Reinforcing bar, per Section 033010 “Miscellaneous Cast-in-Place Concrete.”

    a. Basis-of-Design:

        1) Anchorage designs indicated are based on Hilti HIT- RE 500 V3, unless otherwise noted.
        2) Acceptable Manufacturers: Hilti HIT- RE 500 V3; Simpson Strong Tie Set-3G; or equal.

B. Fastening to Hollow Concrete Block, Brick, or Hollow-Core Precast Concrete Planks: Three-part threaded rod, screen tube, and chemical dispenser anchoring system.

1. Anchors: Meet ICC ES AC58.
2. Adhesive Cartridges: Contain pre-measured amounts of resin and hardener which are mixed and deposited in a screen tube by a dispenser.
3. Anchor: Zinc plated carbon steel or Type 316 stainless steel as indicated consisting of an all-thread anchor rod with nut and washer, of matching material to anchor rod.
4. Reinforcing Bar Dowel: Reinforcing bar, per Section 033010 “Miscellaneous Cast-in-Place Concrete.”
5. Basis-of-Design:

    a. Anchorage designs indicated are based on Hilti HIT HY-70 System, Simpson Strong-Tie ET-3G, unless otherwise noted; or equal.

2.3 PERFORMANCE REQUIREMENTS

A. Performance: design anchors and reinforcing bar dowel anchorage for all anticipated loads and load combinations per ASCE/SEI 7 including omega-naught (Ω_o) factors as applicable..

B. Seismic Performance: post-installed concrete anchors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. Term "withstand" means "the unit system will remain in place without separation of any parts when subjected to the seismic forces specified and the unit system will be fully operational after the seismic event."
2. Component Importance Factor is (I_P):

a. Component Importance Factor (I_P) = 1.0 for all components.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install anchoring system in strict compliance with manufacturer's published installation instructions and approved Shop Drawings. Comply with recommended surface preparation, temperature, and moisture of substrate and ambient conditions.
2. Coordinate installation with Special Inspector.
3. Use drill bit of correct diameter and drill to required depth using rotary impact type hammer drills with carbide-tipped bits.
4. Drill holes perpendicular to concrete surface, unless otherwise indicated.
5. Use oil free compressed air to blast out loose particles and dust from drilled holes.

B. Expansion anchors:

1. Check expansion anchors for tightness a minimum of 24 hours after initial installation.

C. Adhesive anchoring system:

1. Perform installation only by personnel trained in anchor installation and having certification required in PART 1 - GENERAL.
2. Inject adhesive and install anchors or reinforcing bar dowels that are clean and free of dirt, oil, grease, ice, or other deleterious material which would reduce bond.

3.2

3.2 REPAIRS

A. At testing completion, repair damaged concrete, post-installed anchors, reinforcing bar dowels and other damaged construction as required to match conditions prior to testing.

B. Repair in accordance with provisions of Section 030130.71 “Modifications to Existing Concrete” concrete damaged by testing as directed by Engineer, including but not limited to:

1. Saw cutting and removal of damaged, loose, or unsound concrete.
2. Removal of damaged anchors or reinforcing bar dowels.
3. Cleaning and preparing concrete surface and reinforcing bar dowels.
4. Place new repair material.

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5. Install new anchors or reinforcing bar dowels to replace anchors or reinforcing bar dowels that are found to be unacceptable or deficient.
6. Perform repairs at no additional cost to Owner.

END OF SECTION 050519

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SECTION 052100 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. K-series steel joists.
2. K-series steel joist substitutes.
3. Joist accessories.

B. Related Requirements:

1. Section 033010 "Miscellaneous Cast-in-Place Concrete" for installing bearing plates in concrete.
2. Section 042200 "Concrete Unit Masonry" for installing bearing plates in unit masonry.
3. Section 053100 “Steel Decking” for steel decking installed on steel joist framing.
4. Section 055000 "Metal Fabrication” for miscellaneous metal items installed as part of the steel joist framing work.

1.3 DEFINITIONS

A. SJI's "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."

B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support nonuniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of joist, accessory, and product.

B. Design calculations: For all joists.

C. Shop Drawings:

1. Include layout, designation, number, type, location, and spacing of joists.
2. Include joining and anchorage details; bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction.

3. Indicate locations and details of bearing plates to be embedded in other construction.
4. Materials and details of construction of all members, including camber.
5. Erection marks. Mark each field piece to correspond to the shop drawings.
6. Size and length of all field welds to supports.
7. Uniform, concentrated and varying loads used to design the joists indicated on the Drawings.
8. Drawings and calculations shall be signed and sealed by a Civil or Structural Engineer registered in the State of California.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer professional engineer.

B. Welding certificates.

C. Manufacturer certificates.

D. Mill Certificates: For each type of bolt.

E. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer, registered in the state where the project will be constructed, responsible for its preparation.

F. Field quality-control reports.

G. Certification from the Steel Joist Institute showing that the manufacturer's products conform to the Institute's standards and load tables for the type of member provided.

H. Electrode manufacturer's data for actual electrodes proposed. Data includes manufacturer's recommended welding parameters for each electrode to be used.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications."

1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.

B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

1.8 SEQUENCING

A. Furnish steel bearing plates to be built into masonry construction.

1.9 FIELD CONDITIONS

A. Verify, at the site, both the dimensions and work of other trades adjoining the work of this Section before installation of the items specified.

B. Coordinate locations of openings and weight of equipment mounted on steel joists.

C. Provide steel framing around openings and miscellaneous steel to erect the joists.

D. Provide additional web members at all concentrated loads not occurring at panel points.

E. The Drawings indicate loads applied to special joists. Locations and loads indicated on the Drawings for equipment and appurtenances supported by special joists are approximate. Coordinate with the manufacturer(s) of the approved equipment and appurtenances to obtain the actual locations and operating loads for the design of special joists. Design joists using load combinations prescribed in the design code indicated on the Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Canam Buildings US Inc.; Canam Group Inc.
2. Gooder-Henrichsen Co.
3. New Millennium Building Systems, LLC.
4. Valley Joist.
5. Vulcraft/Verco Group; a division of Nucor Corp.

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated.

1. Use ASD; data are given at strength-load level.
2. Design special joists to withstand design loads with live-load deflections no greater than the following:

a. Roof Joists: Vertical deflection of 1/240 of the span.

2.3 K-SERIES STEEL JOISTS

A. Manufacture steel joists of type indicated according to "Standard Specification for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.

1. Joist Type: K-series steel joists.

B. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.

C. Provide holes in chord members for connecting and securing other construction to joists.

D. Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications."

E. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."

F. Provide additional accessories where indicated on Drawings:

1. Ceiling extensions.
2. Bottom chord extensions.
3. Headers.

G. Do not camber joists.

H. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

2.4 PRIMERS

A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

B. Primer: Provide shop primer that complies with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

2.5 JOIST ACCESSORIES

A. Bridging: Provide bridging to brace bottom chords against lateral movement under the net wind uplift pressure indicated on the Drawings. Connect all bridging to end walls unless otherwise shown on the Drawings.

B. Bridging: Fabricate as indicated and according to SJI's "Specifications." Furnish additional erection bridging if required for stability.

C. Fabricate steel bearing plates from ASTM A 36/A 36M steel with integral anchorages of sizes and thicknesses indicated. Shop prime paint.

D. Steel bearing plates with integral anchorages are specified in Section 055000 "Metal Fabrications."

E. Furnish ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch of finished wall surface unless otherwise indicated.

1. Finish: Plain, uncoated.

F. High strength steel bolts to conform to ASTM F3125 Type A325 and are mechanically galvanized in accordance with ASTM B695, Class 50, Type II.

1. Finish: Plain.

G. Welding Electrodes: E70XX. Comply with AWS standards.

H. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

I. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

2.6 CLEANING AND SHOP PAINTING

A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.

B. Do not prime paint joists and accessories to receive sprayed fire-resistive materials.

C. Apply one coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.

D. Shop priming of joists and joist accessories is specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Do not install joists until supporting construction is in place and secured.

B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," as indicated joist manufacturer's written instructions, and requirements in this Section.

1. Before installation, splice joists delivered to Project site in more than one piece.
2. Space, adjust, and align joists accurately in location before permanently fastening.
3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads are applied.

C. Field weld joists to supporting steel bearing plates. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

D. Bolt joists to supporting steel framework using high strength steel bolts.

E. Bolt joists to supporting steel framework using high-strength structural bolts. Comply with RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.

F. Weld or bolt bridging to joists and structural steel as shown on the Drawings. Bridging and completely install bridging anchors before construction loads are placed on the steel joists

G. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

H. Do not attach supports or braces for equipment, piping, conduits, ductwork, or other utilities to steel joists, bridging, or accessories unless the steel joists have been designed and fabricated to support all loads due to the equipment, piping, conduits, ductwork, or other utilities.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Visually inspect field welds according to AWS D1.1/D1.1M.

1. In addition to visual inspection, test field welds according to AWS D1.1/D1.1M and the following procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E 165/E 165M.
b. Magnetic Particle Inspection: ASTM E 709.
c. Ultrasonic Testing: ASTM E 164.
d. Radiographic Testing: ASTM E 94.

C. Visually inspect bolted connections.

D. Prepare test and inspection reports.

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3.4 PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists, bearing plates, abutting structural steel, and accessories.

1. Clean and prepare surfaces by hand-tool cleaning according to SSPC-SP 2 or power-tool cleaning according to SSPC-SP 3.
2. Apply a compatible primer of same type as primer used on adjacent surfaces.

C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

END OF SECTION 052100

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SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Roof deck.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
2. Various Sections in Division 07 for insulation and roofing systems applied over steel decking.
3. Section 099113 "Exterior Painting" for repair painting of primed deck and finish painting of deck.
4. Section 099123 "Interior Painting" for repair painting of primed deck and finish painting of deck.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings:

1. Include layout and types of deck panels, anchorage details such as fastener types and sizes, weld types and sizes, and layout patterns, reinforcing channels, cut deck openings, special jointing, closures, cant strips, cover plates accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer's load table including design thickness in inches and section properties, gravity load carrying capability at the span used, and diaphragm shear capacity.

B. Welding certificates.

C. Product Certificates: For each type of steel deck.

D. Product Test Reports: For tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

1. Power-actuated mechanical fasteners.

E. Evaluation Reports: For steel deck, from ICC-ES.

F. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1. Perform by certified welders and in accordance with AISI SG-673 standard.

C. Electrode manufacturer's data for actual electrodes proposed. Data includes manufacturer's recommended welding parameters for each electrode to be used.

D. Electrical Raceway Units: Provide UL-labeled cellular floor-deck units complying with UL 209 and listed in UL's "Electrical Construction Equipment Directory" for use with standard header ducts and outlets for electrical distribution systems.

E. FM Global Listing: Provide steel roof deck evaluated by FM Global and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

F. Certification from the Steel Deck Institute (SDI) that the steel roof deck is designed in accordance with the SDI.

G. Conform to requirements of SDI Standard Specifications for steel roof deck.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

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PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 ROOF DECK

A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, AISI, and ‘North American Specification for the Design of Cold-Formed Steel Structural Members’, and with the following:

1. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 80, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.

a. Color: Manufacturer's standard.

2. Deck Profile: As indicated.
3. Profile Depth: 1-1/2 inches.
4. Design Uncoated-Steel Thickness: As indicated.
5. Design Uncoated-Steel Thicknesses; Deck Unit/Bottom Plate: As indicated.
6. Span Condition: Double span.
7. Side Laps: Nestable Overlapped or interlocking seam at Contractor's option.

2.3 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws, No. 10 minimum diameter.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Closures,,, Cover Plates and: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.

G. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile indicated.

H. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

I. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.

J. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0747 inch thick, with factory-punched hole of 3/8-inch minimum diameter.

K. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.

L. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch-wide flanges and level recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.

M. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight.

N. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

3.3 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:

1. Weld Diameter: Per drawings.
2. Weld Spacing: Weld edge and interior ribs of deck units per drawings. Space welds 12 inches apart in the field of roof and 6 inches apart in roof corners and perimeter, based on roof-area definitions in FMG Loss Prevention Data Sheet 1-28 as indicated.
3. Weld Washers: Install weld washers at each weld location.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 12 inches, and as follows:

1. Fasten with a minimum of 1-1/2-inch-long welds.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 2 inches, with end joints as follows:

1. End Joints: Lapped 2 inches minimum.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld or mechanically fasten flanges to top of deck. Space welds or mechanical fasteners not more than 12 inches apart with at least one weld or fastener at each corner.

1. Install reinforcing channels or zees in ribs to span between supports and weld or mechanically fasten.

E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, cover plates, cant strips and reinforcing channels according to deck manufacturer's

written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Field welds will be subject to inspection.

C. Prepare test and inspection reports.

3.5 PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation and apply repair paint.

1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
2. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

C. Repair Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

END OF SECTION 053100

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SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Interior non-load-bearing wall framing exceeding height limitations of standard, nonstructural metal framing.
2. Ceiling joist framing.
3. Soffit framing.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for miscellaneous steel shapes, masonry shelf angles, and connections used with cold-formed metal framing.
2. Section 092900 "Gypsum Board" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies, with height limitations.
3. Section 092216 "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

C. Delegated-Design Submittal: For cold-formed steel framing.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Product Certificates: For each type of code-compliance certification for studs and tracks.

C. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency.

1. Steel sheet.
2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

D. Evaluation Reports: For nonstandard cold-formed steel framing post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment, indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association the Steel Framing Industry Association or the Steel Stud Manufacturers Association.

D. Comply with AISI S230 "Standard for Cold-Formed Steel Framing - Prescriptive Method for One- and Two-Family Dwellings."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AllSteel & Gypsum Products, Inc.
2. CEMCO; California Expanded Metal Products Co.
3. CRACO Mfg., Inc.
4. ClarkDietrich.

5. Consolidated Fabricators Corp.; Building Products Division.
6. Design Shapes in Steel.
7. Formetal Co. Inc. (The).
8. Jaimes Industries, Inc.
9. MBA Metal Framing.
10. MRI Steel Framing, LLC.
11. Marino\WARE.
12. Mill Steel Framing; Mill Steel Company.
13. Olmar Supply, Inc.
14. Quail Run Building Materials, Inc.
15. SCAFCO Steel Stud Company; Stone Group of Companies.
16. State Building Products, Inc.
17. Steel Construction Systems; Stone Group of Companies.
18. Steel Network, Inc. (The).
19. Steeler, Inc.
20. Super Stud Building Products Inc.
21. TELLING Industries.
22. The Mill Steel Co.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer to design cold-formed steel framing.

1. Include loads as applicable for the project including but not limited to the following:

   a. Dead Loads: for weights of materials and construction.
   b. Wind Loads: Per Specification 018839.
   c. Seismic Loads: Per Specification 018829.

B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated on Drawings.
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

   a. Interior Non-Load-Bearing Framing: Horizontal deflection of 1/360 of the wall height under a horizontal load of 5 lbf/sq. ft..
   b. Ceiling Joist Framing: Vertical deflection of 1/360 of the span for live loads and 1/240 for total loads of the span.

3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

a. Upward and downward movement of 1 inch.

5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

C. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing complies with AISI S100, AISI S200, and the following:

1. Wall Studs: AISI S211.
2. Headers: AISI S212.
3. Lateral Design: AISI S213.

D. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency acceptable to authorities having jurisdiction.

2.3 COLD-FORMED STEEL FRAMING MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:

1. Grade: As required by structural performance.
2. Coating: G60, A60 (ZF180), AZ50 (AZM150), or GF30 (ZGF90).

B. Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: As required by structural performance.
2. Coating: G60.

2.4 INTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch.
2. Flange Width: 1-5/8 inches.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch Matching steel studs.
2. Flange Width: 1-1/4 inches.

C. Vertical Deflection Clips: Manufacturer's standard head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. AllSteel & Gypsum Products, Inc.
    b. CRACO Mfg., Inc.
    c. ClarkDietrich.
    d. Marino\WARE.
    e. SCAFCO Steel Stud Company; Stone Group of Companies.
    f. Simpson Strong-Tie Co., Inc.
    g. Steeler, Inc.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.
2. Flange Width: 1 inch plus the design gap for one-story structures.

E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

    a. Minimum Base-Metal Thickness: 0.0329 inch.
    b. Flange Width: 1 inch plus the design gap for one-story structures.

2. Inner Track: Of web depth indicated, and as follows:

    a. Minimum Base-Metal Thickness: 0.0428 inch.
    b. Flange Width: 2 inch equal to sum of outer deflection track flange width plus 1 inch.

F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

G. Steel Single- or Double-L Headers: Manufacturer's standard L-shapes used to form header beams, of web depths indicated, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch.
2. Top Flange Width: 1-5/8 inches.

2.5 CEILING JOIST FRAMING

A. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, punched with standard holes, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch.
2. Flange Width: 1-5/8 inches, minimum.

2.6 SOFFIT FRAMING

A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch.
2. Flange Width: 1-5/8 inches, minimum.

2.7 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers and knee braces.
9. Joist hangers and end closures.
10. Hole-reinforcing plates.
11. Backer plates.

2.8 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

C. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with design capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 ICC-ES AC193 ICC-ES AC58 or ICC-ES AC308 as appropriate for the substrate.

1. Uses: Securing cold-formed steel framing to structure.
2. Type: Torque-controlled expansion anchor or adhesive anchor.

3. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
4. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F 593, and nuts, ASTM F 594.

D. Power-Actuated Anchors: Fastener systems with design capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.9 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A 780/A 780M.

B. Cement Grout: Portland cement, ASTM C 150/C 150M, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

C. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C 1107/C 1107M, and with a fluid consistency and 30-minute working time.

D. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.

E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.

2.10 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

    a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.

4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.

C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error not to exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.

C. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.

D. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

H. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.4 INTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: 16 inches.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to studs and anchor to building structure.
4. Connect drift clips to cold-formed steel metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Channel Bridging: Cold-rolled steel channel welded or mechanically fastened to webs of punched studs.
2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

1. Install solid blocking at 96-inch centers.

G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 JOIST INSTALLATION

A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.

B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.

1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches.
2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections.

C. Space joists not more than 2 inches from abutting walls, and as follows:

1. Joist Spacing: 16 inches.

D. Frame openings with built-up joist headers, consisting of joist and joist track or another combination of connected joists if indicated.

E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement.

1. Install web stiffeners to transfer axial loads of walls above.

F. Install bridging at intervals indicated on Shop Drawings. Fasten bridging at each joist intersection as follows:

1. Joist-Track Solid Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
2. Combination Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated, and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.

G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.

H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.6 ERECTION TOLERANCES

A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error not to exceed minimum fastening requirements of sheathing or other finishing materials.

3.7 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Engineer.

D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

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END OF SECTION 054000

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SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Steel framing and supports for ceiling-hung toilet compartments.
2. Steel framing and supports for mechanical and electrical equipment.
3. Steel framing and supports for applications where framing and supports are not specified in other Sections.
4. Steel beams.
5. Steel angles.
6. Steel lintels.
7. Steel support brackets.
8. Steel base plates for other than structural steel or equipment.
9. Steel closure plates.
10. Steel splice plates.
11. Steel subframing at roof openings.
12. Shelf angles.
13. Miscellaneous items fabricated from steel aluminum or stainless steel.
14. Metal ladders.
15. Fall Prevention Systems Ladder safety cages.
16. Metal crossovers.
17. Miscellaneous steel trim including steel angle corner guards steel edgings.
18. Downspout guards.
19. Metal downspout boots.
20. Delegated design.

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

C. Related Requirements:

1. Section 033010 "Miscellaneous Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
2. Section 036000 “Grouting” for non-shrink grout.
3. Section 042200 "Concrete Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.
4. Section 050519 “Post-Installed Anchors and Reinforcing Bars” for anchors in various substrates.
5. Various Sections in Divisions 40 - 46 for process mechanical work scopes.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Nonslip aggregates and nonslip-aggregate surface finishes.
2. Prefabricated building columns.
3. Metal nosings and treads.
4. Paint products.

B. Samples:

1. Submit 2 inches by 2 inches samples of cover plates, illustrating surface finish, color, texture and jointing details.
2. Submit samples as requested by the Engineer during construction.

C. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:

1. Steel framing and supports for ceiling-hung toilet compartments.
2. Steel framing and supports for countertops.
3. Steel framing and supports for mechanical and electrical equipment.
4. Steel framing and supports for applications where framing and supports are not specified in other Sections.
5. Shelf angles.
6. Metal ladders.

7. Fall Prevention System Ladder safety cages.
8. Metal crossovers.
9. Miscellaneous steel trim including steel angle corner guards steel edgings.
10. Downspout guards.
11. Metal downspout boots.
12. Loose steel lintels.
13. Miscellaneous steel items.
14. Miscellaneous aluminum items.
15. Miscellaneous stainless-steel items.

D. Samples for Verification: For each type and finish of extruded cover plate.

1.5 DELEGATED-DESIGN SUBMITTALS

A. For ladders, step-overs, and platforms, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

B. Qualifications Statement: Submit qualifications for licensed professional.

1.6 INFORMATIONAL SUBMITTALS

A. Mill Certificates: Signed by aluminum, steel and stainless-steel manufacturers, certifying that products furnished comply with requirements.

B. Welding certificates.

1. Certify that welders have been qualified under AWS, within previous 12 months, to perform welds required under this Section.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.7 QUALITY ASSURANCE

A. Delegated Design Engineer: Licensed professional engineer experienced in design of specified Work and licensed in the State of Project location.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless steel."

D. Evaluation Reports: Post-installed concrete anchors, from ICC-ES for expansion anchors and adhesive anchor system, for installation into cracked concrete or unit masonry, as applicable, indicating conformance with current ICC ES Acceptance Criteria.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design ladders.

B. Structural Performance of Aluminum Ladders: Ensure aluminum ladders withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

C. Structural Performance of platforms and step-overs: Withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Uniform Load: 100 lbf/sq. ft.
2. Concentrated Load: 300 lbf applied on an area of 4 sq. in.
3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
5. Seismic and wind loads per specifications 018829 and 018839.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Wide Flange Shapes: ASTM A992.

C. Steel Other Shapes, Plates, Shapes, and Bars: ASTM A36/A36M.

D. Stainless steel Sheet, Strip, and Plate: ASTM A240/A240M or ASTM A666, Type 316 Type 316L for welded components.

E. Stainless steel Bars and Shapes: ASTM A276, Type 316 Type 316L for welded components.

F. Rolled-Steel Floor Plate: ASTM A786/A786M, rolled from plate complying with ASTM A36/A36M or ASTM A283/A283M, Grade C or D.

G. Rolled-Stainless Steel Floor Plate: ASTM A793.

H. Abrasive-Surface Floor Plate: Steel plate with abrasive granules rolled into surface or with abrasive material metallically bonded to steel.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. IKG.
b. Ohio Gratings, Inc.
c. SlipNOT Metal Safety Flooring, division of Traction Technologies Holdings, LLC.

I. Steel Tubing: ASTM A500/A500M, Grade B cold-formed steel tubing.

J. Steel Pipe: ASTM A53/A53M, Type S Grade B Standard Weight (Schedule 40) unless otherwise indicated.

K. Zinc-Coated Steel Wire Rope: ASTM A741.

1. Wire-Rope Fittings: Hot-dip galvanized-steel connectors with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.

L. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

1. Size of Channels: 1-5/8 by 1-5/8 inches.
2. Material: Galvanized steel, ASTM A653/A653M, structural steel, Grade 33, with G90 coating; 0.108-inch nominal thickness.
3. Material: Cold-rolled steel, ASTM A1008/A1008M, structural steel, Grade 33; 0.0966-inch minimum thickness; unfinished.

M. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

N. Aluminum Extruded Pipe: ASTM B429, Alloy 6063 T6 and Alloy 6061 T6 as indicated.

O. Aluminum Plate and Sheet: ASTM B209, Alloy 6061-T6.

P. Aluminum Extrusions: ASTM B221, Alloy 6061 T6.

Q. Aluminum-Alloy Rolled Tread Plate: ASTM B632/B632M, Alloy 6061-T6.

R. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.

S. Bronze Extrusions: ASTM B455, Alloy UNS No. C38500 (extruded architectural bronze).

T. Bronze Castings: ASTM B584, Alloy UNS No. C83600 (leaded red brass) or No. C84400 (leaded semired brass).

U. Nickel Silver Extrusions: ASTM B151/B151M, Alloy UNS No. C74500.

V. Nickel Silver Castings: ASTM B584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

W. Gray Iron Castings: ASTM A48, Class 35.

X. Ductile Iron Castings: ASTM A536, Grade 65-45-12.

Y. Stainless steel Bolts: ASTM F593, Type 316.

Z. Stainless steel Nuts: ASTM F594, Type 316.

AA. Carbon Steel Bolts and Studs: ASTM A307, Grade A (hot dip galvanized nuts and washers where noted)

BB. High Strength Steel Bolts, Nuts and washers: ASTM F3125, Grade A325 (mechanically galvanized per ASTM B695, Class 50, where noted).

1. Elevated Temperature Exposure: Type I.
2. General Application: Type I or Type II.

CC. Galvanizing: ASTM A123, Zn w/0.05 percent minimum Ni.

DD. Galvanizing, hardware: ASTM A153, Zn w/0.05 percent minimum Ni.

EE. Galvanizing, anchor bolts: ASTM F2329, Zn w/0.05 percent minimum Ni.

FF. Welding electrodes, steel: AWS A5.1 E70xx.

2.3 FASTENERS

A. Unless otherwise noted, provide steel machine bolts for the connection of carbon steel or iron; galvanized steel or stainless-steel machine bolts for the connection of galvanized steel or iron; and stainless steel machine bolts for the connection of aluminum or stainless steel.

B. General: Unless otherwise indicated, provide Type 316 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless steel fasteners for fastening aluminum.
2. Provide stainless steel fasteners for fastening stainless steel.
3. Provide stainless steel fasteners for fastening nickel silver.
4. Provide bronze fasteners for fastening bronze.

C. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.

D. Mechanically Galvanized Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM F3125, Grade A325, Type 3; with hex nuts, ASTM A563, Grade C3; and, where indicated, flat washers.

E. Stainless steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, ASTM F593; with hex nuts, ASTM F594; and, where indicated, flat washers; Alloy Group 1.

F. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.

1. Provide standard headed bolts with heavy hex nuts and Grade A washers.
2. Where galvanized anchor bolts are indicated or specified, provide standard headed bolts with heavy hex nuts and Grade A washers, galvanize in accordance with ASTM F2329.

G. Automatic End Welded Headed Anchor Studs and Flux Ended Studs: Cold drawn steel, ASTM A108,.

1. Basis-of-Design - Headed Anchor Studs as Manufactured by Nelson or equal: H4L Headed Concrete Anchors.

H. Machine bolts and nuts conforming to Federal Specification FF-B-575C. Bolts and nuts: hexagon type. Bolts, nuts, screws, washers and related appurtenances: Type 316 stainless steel.

I. Toggle Bolts: Hilti, Toggler Bolt or equal.

J. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488, conducted by a qualified independent testing agency.

K. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47 malleable iron or ASTM A27 cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

L. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts

2.4 MISCELLANEOUS ALUMINUM

A. Miscellaneous Aluminum: Formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability. Drill or punch holes. Smooth edges without burrs. Fabricate supplementary pieces necessary to complete each item though such pieces are not definitely shown or specified.

B. Connections and Accessories: Sufficient strength to safely withstand the stresses and strains to which they will be subjected. Close fitting exposed joints and jointed where least conspicuous. Conceal threads on threaded connections where practical. Provide continuous welds or intermittent welds on welded connections as specified or shown. Dress face of welds flush and smooth. Weld on unexposed side as much as possible in order to prevent pitting or discoloration of the aluminum exposed surface. Grind smooth continuous welds that will be exposed. Provide holes for temporary field connections and for attachment of the work of other trades.

C. Miscellaneous Aluminum Items: Beams, angles, closure angles, grates, floor plates, stop plates, stair nosings, and other miscellaneous aluminum indicated and not otherwise specified.

D. Angle Frames for Roof Hatches, Beams, Grates, and Similar Items: Complete with welded strap anchors attached.

E. Stair Treads for Aluminum Stairs: As specified for grating and having cast abrasive non-slip nosing as approved.

F. Aluminum Nosing at Concrete Stairs: Furnish with wing type anchors and flat head stainless steel machine screws, 12 inches on center. Provide nosing at concrete ladder openings. Single piece nosing for each step extending to within full ladder width. Set nosing flush with stair tread finish at concrete stairs. Furnish treads with heavy duty protective tape cover.

1. Basis-of-Design: Wooster Products, Inc.; Alumogrit Treads, Type 116; similar by Barry Pattern and Foundry Co.; Andco or equal.

G. Aluminum Finishes:

1. Anodized Finish: Give an anodic oxide treatment in accordance with AA M31C22A41.
2. Mill Finish: Have a cleaned and degreased mill finish on other aluminum items.

2.5 MISCELLANEOUS STEEL

A. Miscellaneous Steel Work: Formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability. Drill or punch holes. Smooth edges without burrs. Fabricate supplementary pieces necessary to complete each item though such pieces are not definitely shown or specified.

B. Connections and Accessories: Sufficient strength to safely withstand the stresses and strains to which they will be subjected. Close fitting exposed joints and jointed where least conspicuous. Conceal thread on threaded connections where practical. Provide continuous welds or intermittent welds on welded connections as specified or shown. Dress face of welds flush and smooth. Grind smooth continuous welds that will be exposed. Provide holes for temporary field connections and for attachment of the work of other trades.

C. Miscellaneous Steel Items: Beams, angles, lintels, metal stairs detailed on the Drawings, support brackets, base plates for other than structural steel or equipment, closure angles, bridge crane rails, monorail hoist beams, holddown straps and lugs, door frames, splice plates, subframing at roof openings and any other miscellaneous steel indicated and not otherwise specified.

D. Structural steel angle and channel door frames: Galvanized. Fabricated with not less than three anchors on each jamb.

E. Steel pipe pieces for sleeves, lifting attachments and other functions: Schedule 40 pipe unless otherwise indicated. Wall and floor sleeves, of steel pipe: Provide welded circumferential steel waterstops at mid-length.

F. Lintels, relief angles or other steel supporting masonry or embedded in masonry: Galvanized.

G. Steel Finish Work: Thoroughly cleaned, by effective means, of loose mill scale, rust and foreign matter. Provide one shop coat of primer compatible with finish coat after fabrication but before shipment. Omit paint within 3 inches of proposed field welds. Apply paint to dry surfaces and be thoroughly and evenly spread and well worked into joints and other open spaces.

H. Galvanizing, where required: Use hot-dip zinc process after fabrication, coating not less than 2 oz/sq. ft. of surface.

2.6 MISCELLANEOUS STAINLESS STEEL

A. Miscellaneous Stainless Steel Work: Formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability. Drill or punch holes. Smooth edges without burrs. Fabricate supplementary pieces necessary to complete each item though such pieces are not definitely shown or specified.

B. Connections and accessories: Sufficient strength to safely withstand the stresses and strains to which they will be subjected. Close fitting exposed joints, jointed where least conspicuous. Conceal threads on threaded connections where practical. Provide continuous welds or intermittent welds on welded connections as specified or shown. Dress face of welds flush and smooth. Grind smooth continuous welds that will be exposed. Provide holes for temporary field connections and for attachment of the work of other trades.

C. Beams, angles, bar racks, and other miscellaneous stainless steel.

2.7 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting" and Section 099123 Interior Painting."

B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

C. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.

D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

E. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

F. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187.

2.8 CASTINGS:

A. General: Good quality, strong, tough, even-grained, smooth, free from scale, lumps, blisters, sand holes, and other defects. Thoroughly clean castings to remove foreign matter, and deleterious films. Castings will be subjected to a hammer inspection in the field by the Engineer. Damaged castings may be rejected and replaced at no cost to the Owner.

B. Matching Surfaces: Machine to a true plane surface allowing contact surfaces to seat without rocking. Provide allowances in patterns so specified thickness is not reduced to obtain finished surfaces. Castings will not be acceptable if actual weight is less than 95 percent of theoretical weight computed from dimensions. Provide facilities for weighing castings in the presence of the Engineer.

2.9 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/4 by 1 inch, with a minimum 6 inch embedment and 1 1/2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.10 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

1. Fabricate units from slotted channel framing where indicated.
2. Furnish inserts for units installed after concrete is placed.

C. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.

D. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.

1. Provide bearing plates welded to beams where indicated.
2. Drill or punch girders and plates for field-bolted connections where indicated.
3. Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at 24 inches o.c.

E. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.

1. Unless otherwise indicated, fabricate from Schedule 40 steel pipe.
2. Unless otherwise indicated, provide 1/2-inch baseplates with four 5/8-inch anchor bolts and 1/4-inch top plates.

F. Galvanize miscellaneous framing and supports where indicated.

G. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.11 SHELF ANGLES

A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.

1. Provide mitered and welded units at corners.

2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.

B. Galvanize and prime shelf angles located in exterior walls.

C. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.12 METAL LADDERS

A. General:

1. Comply with ANSI A14.3.
2. For elevator pit ladders, comply with ASME A17.1/CSA B44.

B. Steel Ladders:

1. Space siderails 16 inches apart, unless otherwise indicated.
2. Siderails: Continuous, 1/2-by-2-1/2-inch steel flat bars, with eased edges.
3. Rungs: 1-inch-diameter steel bars.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
6. Provide nonslip surfaces on top of each rung by coating with abrasive material metallically bonded to rung.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) IKG.
        2) SlipNOT Metal Safety Flooring, division of Traction Technologies Holdings, LLC.

7. Provide platforms as indicated fabricated from welded or pressure-locked steel bar grating, supported by steel angles. Limit openings in gratings to no more than 1/2 inch in least dimension.
8. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets.
9. Galvanize and prime exterior ladders, including brackets.
10. Prime exterior ladders, including brackets and fasteners, with zinc-rich primer.

C. Aluminum Ladders:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Halliday Products.
    b. Kattsafe.
    c. O'Keeffe's Inc.

d. Precision Ladders, LLC.
e. Royalite Manufacturing, Inc.
f. Thompson Fabricating, LLC.
g. UPNOVR, Inc.

2. Space siderails minimum 18 inches apart, unless otherwise indicated.
3. Siderails: Continuous aluminum bars 1/2-by-2-1/2-inch.
4. Rungs: Solid extruded-aluminum tubes, 3/4 inch diameter.
5. Fit rungs in centerline of siderails; fasten as indicated.
6. Wall Support Brackets: Aluminum 6061-T6 spaced 4 feet on center with Type 316 stainless steel fasteners. Fasten side rails to floor with 1/2 inch diameter Type 316 stainless steel expansion anchors.
7. Platforms: Fabricate from pressure-locked aluminum bar grating or extruded-aluminum plank grating, supported by extruded-aluminum framing. Limit openings in gratings to no more than 1/2 inch in least dimension.
8. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted aluminum brackets.
9. Provide minimum 72-inch-high, hinged security door with padlock hasp at foot of ladder to prevent unauthorized ladder use.

D. Stainless steel Ladders:

1. Material: Fabricate from Type 316 stainless steel.
2. Siderails: Continuous 2-3/8-by-2-inch tube, spaced at minimum of 18 inches unless otherwise indicated.
3. Rungs: 3/4 inch diameter stainless steel rods spaced 12-in on center.

a. Fit rungs in centerline of siderails; fasten as indicated.

4. Wall Support Brackets: Type 316 stainless steel spaced 4 feet on center with Type 316 stainless steel fasteners. Fasten side rails to floor with 1/2 inch diameter Type 316 stainless steel expansion anchors.
5. Platforms: Fabricate from pressure-locked aluminum bar grating, supported by extruded-aluminum framing. Limit openings in gratings to no more than 1/2 inch in least dimension.

2.13 LADDER SAFETY CAGES

A. Construct as indicated using aluminum or Type 316 stainless steel.

2.14 LADDER SAFETY SYSTEM

A. Provide a ladder safety system at each ladder more than 20 feet high and as indicated.

1. Provide an aluminum or stainless steel vertical rigid rail, rail brackets for continuous travel, rail extension, stainless steel mounting hardware and fasteners, two non-corrosive metal sliding fall prevention devices, two full body harnesses with "D" rings, accessories and other materials required for complete installation and operation of ladder safety system in accordance with manufacturer's recommendations.

2. Provide 36 inch minimum height permanent aluminum or stainless-steel rail extension compatible with sliding fall prevention device to ensure worker is attached to ladder safety system while mounting and dismounting from a platform or landing. Provide removable ladder extensions at manholes, hatches, and roof scuttles. Provide stainless steel hardware and fasteners, accessories, and other materials required for complete installation to ladders in accordance with manufacturer's recommendations.
3. Provide alignment between successive pieces of rail. Provide allowance for expansion and contraction on long runs.
4. In addition to "D" ring used for attachment to sliding fall prevention device, provide harnesses with at least two "D" rings for attachment of safety straps and lanyards.
5. Attach ladder safety system to installed ladders. Provide sliding fall prevention device allowing worker to climb up and down using both hands and move freely up and down the rail with worker in normal climbing position. Do not allow connection between sliding fall prevention device and harness attachment point to exceed 9 inches. Fabricate ladder safety system to stop the fall of a worker independently from offset ladders, platforms, or safety cages.
6. Conform to OSHA Regulation 1910.21 for ladder safety system. Rope or cable systems will not be allowed.
7. Basis-of-Design - Ladder Safety System: Saf-T-Climb by Honeywell International Inc.; Railok 90 by 3M Fall Protection; GlideLoc System by Honeywell International Inc.; or equal.
8. Provide ladder safety post extensions on fixed ladders 20 feet or less in height located below hatches and roof scuttles and as indicated. Locking aluminum telescoping safety post extension in its vertical position and extend a minimum of 36-in above opening and be secured to ladder rungs with stainless steel fasteners and brackets.

    a. Basis-of-Design: Ladder UP Safety Post, Model LU-4 by Bilco Co.; Series L1E Safety Extension by Halliday Products; or equal.

9. Ladder Shields: Mount 7 feet above finish grade

    a. Basis-of-Design: Lad-Saf Ladder Gate by 3M Fall Protection; or equal.

2.15 COVER PLATE

A. Fabricate aluminum diamond plate and floor plate having a minimum thickness of 3/8 inch. Fabricate frames and supports of aluminum construction. Furnish Type 316 stainless-steel fastening devices and hardware. Provide plates with a mill finish.

B. Provide aluminum angle supports as indicated.

C. Include aluminum angle stiffeners, and fixed and removable sections as indicated.

D. Provide flush stainless-steel bar drop handles for lifting removable sections, one at each end of each section.

2.16 ELEVATOR PIT SUMP COVERS

A. Fabricate from 3/16-inch rolled-steel floor plate with four 1-inch-diameter holes for water drainage and for lifting.

B. Fabricate from welded or pressure-locked steel bar grating Limit openings in gratings to no more than 1/2 inch in least dimension.

C. Provide steel angle supports as indicated.

2.17 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Galvanize and prime exterior miscellaneous steel trim.

D. Prime exterior miscellaneous steel trim with zinc-rich primer.

2.18 DOWNSPOUT GUARDS

A. Fabricate downspout guards from 3/8-inch-thick by 12-inch-wide steel plate, bent to fit flat against the wall or column at both ends and to fit around pipe with 2-inch clearance between pipe and pipe guard. Drill each end for two 3/4-inch anchor bolts.

B. Galvanize and prime downspout guards.

C. Prime downspout guards with zinc-rich primer.

2.19 METAL DOWNSPOUT BOOTS

A. Provide downspout boots made from cast aluminum in heights indicated with inlets of size and shape to suit downspouts. Provide units with flanges and holes for countersunk anchor bolts.

1. Outlet: At 35 degrees from horizontal, to discharge onto splash block or pavement.

B. Prime cast-iron downspout boots with zinc-rich primer.

2.20 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B. Galvanize plates.

C. Prime plates with zinc-rich primer.

2.21 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and or shapes and plates of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings of 8 inches unless otherwise indicated.

C. Galvanize and prime loose steel lintels located in exterior walls.

D. Prime loose steel lintels located in exterior walls with zinc-rich primer.

2.22 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.23 FINISHES, GENERAL

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.24 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products. Limit maximum nickel (Ni) content of galvanizing zinc to 0.05%.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with primers specified in Section 099113 "Exterior Painting" primers specified in Section 099123 "Interior Painting" unless zinc-rich primer is indicated.

D. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:

1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
4. Other Items: SSPC-SP 3, "Power Tool Cleaning."

E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.25 ALUMINUM FINISHES

A. As-Fabricated Finish: AA-M12.

B. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Install all items except those to be embedded in concrete or other masonry which are installed under Division 03 and Division 04 respectively. Install items to be attached to concrete or masonry after such work is completed in accordance with the details shown. Fastening to wood plugs in masonry will not be permitted.

1. Touch up abrasions in the shop primer immediately after erection. Paint areas left unprimed for welding after welding.
2. Clean and repair, after installation, zinc coating which has been burned by welding, abraded, or otherwise damaged. Thoroughly clean damaged area and remove all traces of welding flux and loose or cracked zinc coating prior to painting. Paint the cleaned area per the requirements of ASTM A780.
3. Install specialty products in accordance with the manufacturer's recommendations.
4. Weld headed anchor studs in accordance with manufacturer's recommendations.
5. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

6. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
7. Field Welding: Comply with the following requirements:
8. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
9. Obtain fusion without undercut or overlap.
10. Remove welding flux immediately.
11. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
12. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
13. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
14. Corrosion Protection: Coat concealed surfaces of aluminum and steel that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

    a. Aluminum Contacting a Dissimilar Metal: Apply a heavy brush coat of zinc-chromate primer followed by two coats of aluminum metal and masonry paint to the dissimilar metal.
    b. Aluminum Contacting Masonry or Concrete: Apply a heavy coat of approved alkali resistant paint to the masonry or concrete.
    c. Aluminum Contacting Wood: Apply two coats of aluminum metal and masonry paint to the wood.
    d. Steel Contacting Exposed Concrete or Masonry: Apply heavy bitumastic troweling mastic.
    e. Between aluminum stair treads, and steel supports, insert 1/4 inch thick neoprene isolator pads, 85 plus or minus 5 Shore A durometer, sized for full width and length of bracket or support.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for ceiling hung toilet partitions securely to, and rigidly brace from, building structure.

C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

    1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.

D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.

1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 INSTALLING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting." Section 099123 "Interior Painting."

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.

END OF SECTION 055000

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SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Wood products.
2. Plywood backing panels.

1.3 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.

B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.

C. Exposed Framing: Framing not concealed by other construction.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency in accordance with ASTM D5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates:

1. For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS

A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content:

1. Boards: 15 percent.
2. Dimension Lumber: 15 percent for 2-inch nominal thickness or less; 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1, Use categories as follows:

1. UC2: Interior construction not in contact with ground but may be subject to moisture. Include all rough carpentry.
2. UC3B (Commodity Specification A): Uncoated sawn products in exterior construction not in contact with ground, exposed to all weather cycles including intermittent wetting but with sufficient air circulation for wood to dry. Excludes sawn products not in contact with ground but with ground contact-type hazards. Include all rough carpentry.

3. UC4A (Commodity Specification A): Non-critical sawn products in contact with ground and exposed to all weather cycles including continuous or prolonged wetting, and sawn products not in contact with ground but with ground contact-type hazards or that are critical or hard to replace. Include all rough carpentry.

B. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

C. For exposed items indicated to receive a stained or natural finish, chemical formulations are not to require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

D. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

E. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

F. Application: Treat all rough carpentry unless otherwise indicated.

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED LUMBER

A. General: Where fire-retardant-treated materials are indicated, materials are to comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested in accordance with ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Treatment is not to promote corrosion of metal fasteners.
2. Exterior Type: Treated materials are to comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering in accordance with ASTM D2898. Use for exterior locations and where indicated.
3. Interior Type A: Treated materials are to have a moisture content of 28 percent or less when tested in accordance with ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.

4. Design Value Adjustment Factors: Treated lumber is to be tested according to ASTM D5664 and design value adjustment factors are to be calculated according to ASTM D6841. For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.

C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent. Kiln-dry plywood after treatment to maximum moisture content of 15 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency and other information required by authorities having jurisdiction.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by testing agency.

E. For exposed items indicated to receive a stained or natural finish, chemical formulations are not to bleed through, contain colorants, or otherwise adversely affect finishes.

F. Application: Treat all rough carpentry unless otherwise indicated.

1. Concealed blocking.
2. Wood cants, nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing.
3. Plywood backing panels.

2.4 MISCELLANEOUS LUMBER

A. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.

B. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

C. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.5 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.6 FASTENERS

A. General: Fasteners are to be of size and type indicated and comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M or ASTM F2329.

B. Nails, Brads, and Staples: ASTM F1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 as appropriate for the substrate.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.

D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

E. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.

F. Do not splice structural members between supports unless otherwise indicated.

G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

H. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:

1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.

I. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

J. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

K. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

L. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.10.1, "Fastening Schedule," in ICC's International Building Code (IBC).
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

M. Securely attach roofing nailers to substrates by anchoring and fastening to withstand bending, shear, or other stresses imparted by Project wind loads and fastener-resistance loads as designed in accordance with ASCE/SEI 7.

N. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

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3.2 INSTALLATION OF WOOD BLOCKING AND NAILERS

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach wood blocking to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Attach wood roofing nailers securely to substrate to resist the designed outward and upward wind loads indicated on Drawings and in accordance with ANSI/SPRI ED-1, Tables A6 and A7.

D. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

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SECTION 064116 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Plastic-laminate-faced architectural cabinets.
2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets that are not concealed within other construction.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.
2. Section 123623.13 "Plastic-Laminate-Clad Countertops."

1.3 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings: For plastic-laminate-faced architectural cabinets.

1. Include plans, elevations, sections, and attachment details.
2. Show large-scale details.

3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.
5. Apply AWI Quality Certification Program label to Shop Drawings.

C. Samples: For each exposed product and for each color and texture specified, in manufacturer's or fabricator's standard size.

D. Samples for Initial Selection: For each type of exposed finish.

E. Samples for Verification: For the following:

1. Plastic Laminates: 12 by 12 inches, for each type, color, pattern, and surface finish required.

a. Provide one sample applied to core material with specified edge material applied to one edge.

2. Corner Pieces:

a. Cabinet-front frame joints between stiles and rails and at exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
b. Miter joints for standing trim.

3. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and fabricator.

B. Product Certificates: For each type of product.

1. Composite wood and agrifiber products.
2. High-pressure decorative laminate.
3. Adhesives.

C. Quality Standard Compliance Certificates: AWI Quality Certification Program.

D. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Shop Certification: AWI's Quality Certification Program accredited participant.

B. Installer Qualifications: AWI's Quality Certification Program accredited participant.

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockups of typical architectural cabinets as shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

B. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

C. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction and indicate measurements on Shop Drawings.

D. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that woodwork complies with requirements of grades specified.
2. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.

B. Grade: Premium.

C. Type of Construction: Frameless.

D. Door and Drawer-Front Style: Flush overlay.

E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Albet Laminati.
    b. Formica Corporation.
    c. Lamin-Art, Inc.
    d. Wilsonart LLC.

F. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGS.
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade HGS.
4. Edges: Grade HGS.
5. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.

G. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS .

    a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12 inch thick, matching laminate in color, pattern, and finish.
    b. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.
    c. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS.

2. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
3. Drawer Bottoms: Hardwood plywood.

H. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.

I. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

J. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints.

K. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As selected by Engineer from laminate manufacturer's full range in the following categories:

a. Solid colors, matte finish.
b. Solid colors with core same color as surface, matte finish.
c. Wood grains, matte finish.
d. Patterns, matte finish.

2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Wood Moisture Content: 8 to 13 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087100 "Door Hardware."

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Doug Mockett.
b. Accuride International.
c. Blum, Julius & Co., Inc.
d. CompX International, Inc.

B. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, B01602, 170 degrees of opening, self-closing.

C. Back-Mounted Pulls: ANSI/BHMA A156.9, B02011.

D. Wire Pulls: Back mounted, solid metal, Basis of design Mockett DP3C Type, Satin Chrome, 1 1/4 inch length, edge mounted Flat angled pull with 1/4” inch dia. Ridge. US26D Finish.

E. Catches: Magnetic catches, ANSI/BHMA A156.9, B03141.

F. Adjustable Shelf Standards and Supports: ANSI/BHMA A156.9, B04071; with shelf rests, B04081.

G. Shelf Rests: ANSI/BHMA A156.9, B04013; metal.

H. Drawer Slides: ANSI/BHMA A156.9.

1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer.

    a. Type: Full extension.
    b. Material: Epoxy-coated steel with polymer rollers.

2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 2.
4. For drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide Grade 1.
5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-100.
6. For computer keyboard shelves, provide Grade 1.
7. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-100.

I. Grommets for Cable Passage: 1-1/4-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.

1. Color: White.

J. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for BHMA finish number indicated.

1. Dark, Oxidized, Satin Bronze, Oil Rubbed: ANSI/BHMA 613 for bronze base; ANSI/BHMA 640 for steel base; match Engineer's sample.
2. Bright Brass, Clear Coated: ANSI/BHMA 605 for brass base; ANSI/BHMA 632 for steel base.
3. Bright Brass, Vacuum Coated: ANSI/BHMA 723 for brass base; ANSI/BHMA 729 for zinc-coated-steel base.
4. Satin Brass, Blackened, Bright Relieved, Clear Coated: ANSI/BHMA 610 for brass base; ANSI/BHMA 636 for steel base.
5. Satin Chromium Plated: ANSI/BHMA 626 for brass or bronze base; ANSI/BHMA 652 for steel base.
6. Bright Chromium Plated: ANSI/BHMA 625 for brass or bronze base; ANSI/BHMA 651 for steel base.
7. Satin Stainless Steel: ANSI/BHMA 630.

K. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

C. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.

1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.5 FABRICATION

A. Fabricate architectural cabinets to dimensions, profiles, and details indicated.

B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Engineer seven days in advance of the dates and times architectural cabinet fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

D. Install glass to comply with applicable requirements in Section 088000 "Glazing" and in GANA's "Glazing Manual."

1. For glass in frames, secure glass with removable stops.
2. For exposed glass edges, polish and grind smooth.

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PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.2 INSTALLATION

A. Grade: Install cabinets to comply with quality standard grade of item to be installed.

B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.

C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.

D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inchesusing concealed shims.

1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 064116

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SECTION 070150.19 - PREPARATION FOR REROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. The Work of This Section Includes:

1. Full roof tear-off.
2. Roof re-cover preparation.

B. Related Requirements:

1. Section 01110 "Coordination of Work" for use of premises and for phasing requirements.

1.3 DEFINITIONS

A. EPS: Molded (expanded) polystyrene.

B. Full Roof Tear-off: Removal of existing roofing system down to existing roof deck.

C. OSB: Oriented strand board.

D. Roofing Terminology: Definitions in ASTM D1079 and glossary of NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

E. Roof Re-Cover Preparation: Existing roofing system is to remain and be prepared for new roof installed over it.

1.4 PREINSTALLATION MEETINGS

A. Preliminary Roofing Conference: Before starting removal Work, conduct conference at Project site.

1. Meet with Owner, Engineer, Construction Manager, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing tear-off, including, but not limited to, the following:

a. Reroofing preparation, including roofing system manufacturer's written instructions.
b. Temporary protection requirements for existing roofing system components that are to remain.
c. Existing roof drains and roof drainage during each stage of reroofing, and roof-drain plugging and plug removal.
d. Construction schedule and availability of materials, Installer's personnel, equipment, and facilities needed to avoid delays.
e. Condition and acceptance of existing roof deck and base flashing substrate for reuse.
f. Structural loading limitations of roof deck during reroofing.
g. Base flashings, special roofing details, drainage, penetrations, equipment curbs, and condition of other construction that affect reroofing.
h. HVAC shutdown and sealing of air intakes.
i. Shutdown of fire-suppression, -protection, and -alarm and -detection systems.
j. Asbestos removal and discovery of asbestos-containing materials.
k. Governing regulations and requirements for insurance and certificates if applicable.
l. Existing conditions that may require Engineer notification before proceeding.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1. Include certificate that Installer is approved by warrantor of existing roofing system.

B. Field Test Reports: Fastener pull-out test report.

C. Photographs or Video: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces, that might be misconstrued as having been damaged by reroofing operations.

1. Submit before Work begins.

1.7 CLOSEOUT SUBMITTALS

A. Certified statement from manufacturer for existing warranted roof system stating that existing roof warranty has not been affected by Work performed under this Section.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Approved by warrantor of existing roofing system to work on existing roofing.

B. Regulatory Requirements:

1. Comply with governing EPA notification regulations before beginning roofing removal.
2. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.9 FIELD CONDITIONS

A. Existing Roofing System:Membrane roofing.

B. Owner will occupy portions of building immediately below reroofing area.

1. Conduct reroofing so Owner's operations are not disrupted.
2. Provide Owner with not less than 72 hours' written notice of activities that may affect Owner's operations.
3. Coordinate work activities daily with Owner so Owner has adequate advance notice to place protective dust and water-leakage covers over sensitive equipment and furnishings, shut down HVAC and fire-alarm or -detection equipment if needed, and evacuate occupants from below work area.
4. Before working over structurally impaired areas of deck, notify Owner to evacuate occupants from below affected area.

a. Verify that occupants below work area have been evacuated before proceeding with work over impaired deck area.

C. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations.

D. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.

E. Conditions existing at time of inspection for bidding will be maintained by Owner as far as practical.

1. Construction Drawings and Project Manual for existing roofing system are provided for Contractor's convenience and information, but they are not a warranty of existing conditions. They are intended to supplement rather than serve in lieu of Contractor's own investigations. Contractor is responsible for conclusions derived from existing documents.

F. Weather Limitations: Proceed with reroofing preparation only when existing and forecasted weather conditions permit Work to proceed without water entering existing roofing system or building.

1. Remove only as much roofing in one day as can be made watertight in the same day.

G. Hazardous Materials:

1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Engineer and Owner.

a. Hazardous materials will be removed by Owner under a separate contract.

1.10 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during reroofing, by methods and with materials so as not to void existing roofing system warranty issued by manufacturer for existing warranted roof system.

1. Notify warrantor before proceeding with the Work.
2. Notify warrantor of existing roofing system on completion of reroofing, and obtain documentation verifying that existing roofing system has been inspected and warranty remains in effect.

a. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.1 TEMPORARY PROTECTION MATERIALS

A. EPS Insulation: ASTM C578.

B. Plywood: DOC PS 1, Grade CD, Exposure 1.

C. OSB: DOC PS 2, Exposure 1.

2.2 INFILL AND REPLACEMENT MATERIALS

A. Use infill materials matching existing roofing system materials unless otherwise indicated.

1. Infill materials are specified in Section 075419 "Polyvinyl-Chloride (PVC) Roofing" unless otherwise indicated.

B. Steel deck is specified in Section 053100 "Steel Decking."

C. Wood blocking, curbs, and nailers are specified in Section 061000 "Rough Carpentry."

D. Parapet Sheathing:

1. ASTM C1177/C1177M or ASTM C1278/C1278M water-resistant gypsum substrate; 1/2 inch thick.

E. Fasteners: Factory-coated steel fasteners with metal or plastic plates listed in FM Approvals' RoofNav, and acceptable to new roofing system manufacturer.

2.3 AUXILIARY REROOFING MATERIALS

A. General: Use auxiliary reroofing preparation materials recommended by roofing system manufacturer for intended use and compatible with components of existing and new roofing system.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection of In-Place Conditions:

1. Protect existing roofing system that is not to be reroofed.
2. Loosely lay 1-inch- minimum thick, EPS insulation over existing roofing in areas not to be reroofed.

    a. Loosely lay 15/32-inch plywood or OSB panels over EPS. Extend EPS past edges of plywood or OSB panels a minimum of 1 inch.

3. Limit traffic and material storage to areas of existing roofing that have been protected.
4. Maintain temporary protection and leave in place until replacement roofing has been completed. Remove temporary protection on completion of reroofing.
5. Comply with requirements of existing roof system manufacturer's warranty requirements.

B. Seal or isolate windows that may be exposed to airborne substances created in removal of existing materials.

C. Shut off rooftop utilities and service piping before beginning the Work.

D. Test existing roof drains to verify that they are not blocked or restricted.

1. Immediately notify Engineer of any blockages or restrictions.

E. Coordinate with Owner to shut down air-intake equipment in the vicinity of the Work.

1. Cover air-intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.

F. During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.

G. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday.

1. Prevent debris from entering or blocking roof drains and conductors.

    a. Use roof-drain plugs specifically designed for this purpose.
    b. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.

2. If roof drains are temporarily blocked or unserviceable due to roofing system removal or partial installation of new roofing system, provide alternative drainage method to remove water and eliminate ponding.

    a. Do not permit water to enter into or under existing roofing system components that are to remain.

3.2 ROOF TEAR-OFF

A. Notify Owner each day of extent of roof tear-off proposed for that day and obtain authorization to proceed.

B. Lower removed roofing materials to ground and onto lower roof levels, using dust-tight chutes or other acceptable means of removing materials from roof areas.

C. Remove loose aggregate from aggregate-surfaced, built-up bituminous roofing using a power broom.

D. Full Roof Tear-off: Remove existing roofing and other roofing system components down to the existing roof deck concrete fill.

1. Remove vapor retarder roof insulation and cover board.
2. Remove base flashings and counter flashings.
3. Remove perimeter edge flashing and gravel stops.
4. Remove copings.
5. Remove expansion-joint covers.
6. Remove flashings at pipes, curbs, mechanical equipment, and other penetrations.
7. Remove roof drains indicated on Drawings to be removed.
8. Remove wood blocking, curbs, and nailers.
9. Bitumen and felts that are firmly bonded to concrete decks are permitted to remain if felts are dry.
    a. Remove unadhered bitumen, unadhered felts, and wet felts.
10. Remove excess asphalt from steel deck.
    a. A maximum of 15 lb/100 sq. ft. of asphalt is permitted to remain on steel decks.

3.3 DECK PREPARATION

A. Inspect deck after tear-off of roofing system.

B. If deck surface is unsuitable for receiving new roofing or if structural integrity of deck is suspect, immediately notify Engineer.

1. Do not proceed with installation until directed by Engineer.

3.4 INFILL MATERIALS INSTALLATION

A. Immediately after roof tear-off, and inspection and repair, if needed, of deck, fill in tear-off areas to match existing roofing system construction.

1. Installation of infill materials is specified in Section 075419 "Polyvinyl-Chloride (PVC) Roofing."
2. Installation of wood blocking, curbs, and nailers is specified in Section 061000 "Rough Carpentry."

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3.5 ROOF RE-COVER PREPARATION

A. Remove blisters, ridges, buckles, and other substrate irregularities from existing roofing that inhibit new recover boards from conforming to substrate.

1. Remove loose aggregate from aggregate-surfaced, built-up bituminous roofing with a power broom.
2. Broom clean existing substrate.
3. Coordinate with Owner's inspector to schedule times for tests and inspections.
4. Verify that existing substrate is dry.

    a. Spot check substrates with an electrical capacitance moisture-detection meter.

5. Remove materials that are wet or damp.

    a. Removal will be paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents.

B. Remove blisters and areas of roofing not fully adhered.

3.6 DISPOSAL

A. Collect demolished materials and place in containers.

1. Promptly dispose of demolished materials.
2. Do not allow demolished materials to accumulate on-site.
3. Storage or sale of demolished items or materials on-site is not permitted.

B. Transport and legally dispose of demolished materials off Owner's property.

END OF SECTION 070150.19

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SECTION 071900 - WATER REPELLENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Penetrating water repellents.
2. MPI-approved water repellents.

B. Related Requirements:

1. Section 042200 "Concrete Unit Masonry" for integral water-repellent admixture for unit masonry assemblies.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's printed statement of VOC content.
2. Include manufacturer's recommended number of coats for each type of substrate and spreading rate for each separate coat.
3. Include printout of current "MPI Approved Products List" for each product category specified in PART 2 that specifies water repellents approved by MPI, with the proposed product highlighted.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Applicator and testing agency.

B. Product Certificates: For each type of water repellent.

C. Preconstruction Test Reports: For water-repellent-treated substrates.

D. Sample Warranty: For special warranty.

1.6 QUALITY ASSURANCE

A. Applicator Qualifications: An employer of workers trained and approved by manufacturer.

B. MPI Standards: Comply with MPI standards indicated and provide water repellents listed in its "MPI Approved Products List."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 35 deg F and not more than 110 deg F, in accordance with manufacturer's written instructions.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.
3. Protect materials from direct sunlight.

1.8 FIELD CONDITIONS

A. Limitations: Proceed with application only when the following existing and forecasted weather and substrate conditions permit water repellents to be applied in accordance with manufacturers' written instructions and warranty requirements:

1. Concrete surfaces and mortar have cured for not less than 28 days.
2. Building has been closed in for not less than 30 days before treating wall assemblies.
3. Ambient temperature is above 40 deg F and below 100 deg F and will remain so for 24 hours.
4. Substrate is not frozen and substrate-surface temperature is above 40 deg F and below 100 deg F.
5. Rain or snow is not predicted within 24 hours.
6. Not less than seven days have passed since surfaces were last wet.
7. Windy conditions do not exist that might cause water repellent to be blown onto vegetation or surfaces not intended to be treated.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer and Applicator agree(s) to repair or replace materials that fail to maintain water repellency specified in "Performance Requirements" Article within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Water repellents must meet the following performance requirements as determined by preconstruction testing on manufacturer's standard substrates representing those indicated for this Project.

B. Water Absorption: Minimum 80 percent reduction of water absorption after 24 hours for treated compared to untreated specimens when tested in accordance with the following:

1. Concrete Masonry Units: ASTM C140/C140M.

C. Water-Vapor Transmission: Comply with one or both of the following:

1. Maximum 10 percent reduction in water-vapor transmission of treated compared to untreated specimens, in accordance with ASTM E96/E96M.
2. Minimum 80 percent water-vapor transmission of treated compared to untreated specimens, in accordance with ASTM D1653.

D. Water Penetration and Leakage through Masonry: Minimum 90 percent reduction in leakage rate of treated compared to untreated specimens, in accordance with ASTM E514/E514M.

E. Durability: Maximum 5 percent loss of water-repellent performance after 2500 hours of weathering in accordance with ASTM G154 compared to water-repellent-treated specimens before weathering.

2.2 PENETRATING WATER REPELLENTS

A. Penetrating Silane/Siloxane-Blend Water Repellent: Clear, containing 10 percent or more active content of silane and siloxane blend with 600 g/L or less of VOCs.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Advanced Chemical Technologies, Inc.
b. BASF Corporation.
c. Euclid Chemical Company (The); an RPM company.

2.3 MPI-APPROVED WATER REPELLENTS

A. Water Repellent, Clear (Not Paintable); MPI #117: Penetrating, silicone-oil type, clear water-repellent for interior or exterior masonry block or brick, not intended for recoating.

1. VOC Content: 600 g/L or less.
2. MPI Green Performance Standard: GPS-2.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements and conditions affecting performance of the Work.

1. Verify that surfaces are clean and dry in accordance with water-repellent manufacturer's requirements. Check moisture content in three representative locations by method recommended by manufacturer.
2. Verify that there is no efflorescence or other removable residues that would be trapped beneath the application of water repellent.
3. Verify that required repairs are complete, cured, and dry before applying water repellent.

B. Test pH level in accordance with water-repellent manufacturer's written instructions to ensure chemical bond to silica-containing or siliceous minerals.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. New Construction and Repairs: Allow concrete and other cementitious materials to age before application of water repellent, in accordance with repellent manufacturer's written instructions.

B. Cleaning: Before application of water repellent, clean substrate of substances that could impair penetration or performance of product in accordance with water-repellent manufacturer's written instructions and as follows:

1. Concrete-Based Substrates: Remove oil, curing compounds, laitance, and other substances that inhibit penetration or performance of water repellents on concrete masonry unit substrate in accordance with ASTM E1857.

C. Protect adjoining work, including mortar and sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Cover live vegetation.

D. Coordination with Mortar Joints: Do not apply water repellent until pointing mortar for joints adjacent to surfaces receiving water-repellent treatment has been installed and cured.

E. Coordination with Sealant Joints: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.

1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those required.

3.3 APPLICATION OF WATER REPELLENTS

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of water repellent and to instruct Applicator on the product and application method to be used.

B. Apply coating of water repellent on surfaces to be treated using 15 psi pressure spray with a fan-type spray nozzle to the point of saturation. Apply coating in dual passes of uniform, overlapping strokes. Remove excess material; do not allow material to puddle beyond saturation. Comply with manufacturer's written instructions for application procedure unless otherwise indicated.

C. Apply a second saturation coating, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

3.4 FIELD QUALITY CONTROL

A. Testing of Water-Repellent Material: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when water repellent is being applied:

1. Owner may engage the services of a qualified testing agency to sample water-repellent material being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform tests for compliance of water-repellent material with product requirements.
3. Owner may direct to stop applying water repellents if test results show material being used does not comply with product requirements. Remove noncomplying material from Project site, pay for testing, and correct deficiency of surfaces treated with rejected materials, as approved by Engineer.

B. Coverage Test: In the presence of Engineer, hose down a dry, repellent-treated surface to verify complete and uniform product application. A change in surface color will indicate incomplete application.

1. Notify Engineer seven days in advance of the dates and times when surfaces will be tested.
2. Reapply water repellent until coverage test indicates complete coverage.

3.5 CLEANING

A. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application, in accordance with manufacturer's written cleaning instructions, as work progresses. Correct damage to work of other trades caused by water-repellent application, as approved by Engineer.

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SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Polyisocyanurate foam-plastic board insulation.
2. Glass-fiber blanket insulation.
3. Mineral-wool blanket insulation.

B. Related Requirements:

1. Section 042200 "Concrete Unit Masonry" for insulation installed in masonry cells.
2. Section 075419 "Polyvinyl-Chloride (PVC) Roofing" for insulation specified as part of roofing construction.
3. Section 092900 "Gypsum Board" for sound attenuation blanket used as acoustic insulation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Installer's Certification: Listing type, manufacturer, and R-value of insulation installed in each element of the building thermal envelope.

1. Sign, date, and post the certification in a conspicuous location on Project site.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Research Reports: For foam-plastic insulation, from ICC-ES.

D. Provide documentation verifying that thermal insulation materials meet the pollutant emission limits in accordance with the California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.2 (January 2017), as referenced in CALGreen.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indexes less than Class A, 25 and 450 when tested in accordance with ASTM E84.

B. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

C. Thermal-Resistance Value (R-Value): R-value as indicated on Drawings in accordance with ASTM C518.

2.2 POLYISOCYANURATE FOAM-PLASTIC BOARD INSULATION

A. Polyisocyanurate Board Insulation, Foil Faced: ASTM C1289, foil faced, Type I, Class 1 or 2.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Carlisle Coatings & Waterproofing Inc.
b. Firestone Building Products.
c. Johns Manville; a Berkshire Hathaway company.

2.3 GLASS-FIBER BLANKET INSULATION

A. Glass-Fiber Blanket Insulation, Unfaced: ASTM C665, Type I; passing ASTM E136 for combustion characteristics.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed Corporation.
b. CertainTeed Insulation.
c. Johns Manville; a Berkshire Hathaway company.

B. Glass-Fiber Blanket Insulation, Polypropylene-Scrim-Kraft Faced: ASTM C665, Type II (nonreflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier).

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed Corporation.
b. CertainTeed Insulation.
c. Johns Manville; a Berkshire Hathaway company.

2.4 MINERAL-WOOL BLANKET INSULATION

A. Mineral-Wool Blanket Insulation, Unfaced: ASTM C665, Type I (blankets without membrane facing); consisting of fibers; complying with ASTM E136 for combustion characteristics.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Johns Manville; a Berkshire Hathaway company.
b. Rockwool International.
c. Thermafiber, Inc.; an Owens Corning company.

B. Mineral-Wool Blanket Insulation, Reinforced-Foil Faced: ASTM C665, Type III (reflective faced); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Thermafiber, Inc.; an Owens Corning company.

2.5 INSULATION FASTENERS

A. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates without damaging insulation, fasteners, or substrates.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AGM Industries, Inc.
b. Gemco.

2.6 ACCESSORIES

A. Insulation for Miscellaneous Voids:

1. Glass-Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E84.
2. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.

B. Miscellaneous Application Accessories:

1. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.
2. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide ventilation between insulated attic spaces and vented eaves.
3. Detailing Foam Insulation for Voids: Urethane foam complying with AAMA 812, low expansion pressure suitable for filling insulation gaps and voids adjacent to openings to protect against water, air, and sound intrusion.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or those that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products, applications and applicable codes.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Install insulation with manufacturer's R-value label exposed after insulation is installed.

D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install in cavities formed by framing members in accordance with the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.

4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
5. Where glass-fiber blankets are indicated for sound attenuation above ceilings, install unfaced blanket insulation over ceiling area in thickness indicated. Where partitions occur, extend insulation up either side of partition.

6. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings and seal each continuous area of insulation to ensure airtight installation.

    a. Exterior Walls: Set units with facing placed toward as indicated on Drawings.
    b. Interior Walls: Set units with facing placed toward areas of high humidity.

B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.
2. Detailing Foam Insulation for Voids: Apply in accordance with manufacturer's written instructions.

3.4 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

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SECTION 072600 - VAPOR RETARDERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Polyethylene vapor retarders.

B. Related Requirements:

1. Section 033010 "Miscellaneous Cast-in-Place Concrete" for under-slab vapor retarders.
2. Section 072100 "Thermal Insulation" for vapor retarders integral with insulation products.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Polyethylene vapor retarders.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each product, for tests performed by a qualified testing agency.

PART 2 - PRODUCTS

2.1 POLYETHYLENE VAPOR RETARDERS

A. Polyethylene Vapor Retarders: ASTM D4397, 15-mil thick sheet, with maximum permeance rating of 0.1 perm.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. StegoWrap
b. Viper Vaporcheck

2.2 ACCESSORIES

A. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

B. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and has demonstrated capability to bond vapor retarders securely to substrates indicated.

C. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to vapor retarders, including removing projections capable of puncturing vapor retarders.

3.2 INSTALLATION OF VAPOR RETARDERS ON FRAMING

A. Place vapor retarders on side of construction indicated on Drawings.

B. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives, vapor retarder fasteners, or other anchorage system as recommended by manufacturer. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

C. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs and sealing with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Locate all joints over framing members or other solid substrates.

D. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.

E. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

3.3 PROTECTION

A. Protect vapor retarders from damage until concealed by permanent construction.

END OF SECTION 072600

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SECTION 074213.23 - METAL COMPOSITE MATERIAL WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes metal composite material wall panels.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Engineer, Owner's insurer if applicable, metal composite material panel Installer, metal composite material panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal composite material panels, including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal composite material panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal composite material panels.
6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
7. Review temporary protection requirements for metal composite material panel assembly during and after installation.
8. Review procedures for repair of panels damaged after installation.
9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

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B. Shop Drawings:

1. Include fabrication and installation layouts of metal composite material panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment assembly, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim and anchorage, at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Initial Selection: For each type of metal composite material panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Metal Composite Material Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal composite material panel accessories.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal composite material panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal composite material panels, and other manufactured items so as not to be damaged or deformed. Package metal composite material panels for protection during transportation and handling.

B. Unload, store, and erect metal composite material panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal composite material panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal composite material panels to ensure dryness, with positive slope for drainage of water. Do not store metal composite material panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal composite material panels during installation.

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1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal composite material panels to be performed according to manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

A. Coordinate metal composite material panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal composite material panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal composite material panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal composite material panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E330:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.
3. Deflection Limits: For wind loads, no greater than 1/180 of the span.

B. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METAL COMPOSITE MATERIAL WALL PANELS

A. Metal Composite Material Wall Panel Systems: Provide factory-formed and -assembled, metal composite material wall panels fabricated from two metal facings that are bonded to a solid, extruded thermoplastic core; formed into profile for installation method indicated. Include attachment assembly components, and accessories required for weathertight system.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Alcoa Architectural Products (USA).
b. ALUCOBOND; 3A Composites USA, Inc.
c. Alucoil North America.

B. Aluminum-Faced Composite Wall Panels: Formed with 0.020-inch- thick, coil-coated aluminum sheet facings.

1. Panel Thickness: 0.236 inch.
2. Core: Standard.
3. Exterior Finish: Three-coat fluoropolymer.

a. Color: As selected by Engineer from manufacturer's full range.

C. Attachment Assembly Components: Formed from extruded aluminum.

D. Attachment Assembly: Manufacturer's standard.

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal composite material panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets,

fillers, closure strips, and similar items. Match material and finish of metal composite material panels unless otherwise indicated.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal composite material panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal composite material panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal composite material panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Sealants: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal composite material panels and remain weathertight; and as recommended in writing by metal composite material panel manufacturer.

2.4 FABRICATION

A. General: Fabricate and finish metal composite material panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Fabricate metal composite material panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Aluminum Panels and Accessories:

1. Three-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal composite material panel supports, and other conditions affecting performance of the Work.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal composite material wall panel manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal composite material wall panel manufacturer.

a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and assemblies penetrating metal composite material panels to verify actual locations of penetrations relative to seam locations of metal composite material panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal composite material panel manufacturer's written recommendations.

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3.3 METAL COMPOSITE MATERIAL PANEL INSTALLATION

A. General: Install metal composite material panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to supports unless otherwise indicated. Anchor metal composite material panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal composite material panels.
2. Flash and seal metal composite material panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal composite material panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal composite material panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of metal composite material panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal composite material panel manufacturer.

D. Attachment Assembly, General: Install attachment assembly required to support metal composite material wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.

1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.

E. Installation: Attach metal composite material wall panels to supports at locations, spacings, and with fasteners recommended by manufacturer to achieve performance requirements specified.

1. Wet Seal Systems: Seal horizontal and vertical joints between adjacent metal composite material wall panels with sealant backing and sealant. Install sealant backing and sealant according to requirements specified in Section 079200 "Joint Sealants."
2. Dry Seal Systems: Seal horizontal and vertical joints between adjacent metal composite material wall panels with manufacturer's standard gasket system.
3. Rainscreen Systems: Do not apply sealants to joints unless otherwise indicated.

F. Clip Installation: Attach panel clips to supports at locations, spacings, and with fasteners recommended by manufacturer. Attach routed-and-returned flanges of wall panels to panel clips with manufacturer's standard fasteners.

1. Seal horizontal and vertical joints between adjacent panels with sealant backing and sealant. Install sealant backing and sealant according to requirements specified in Section 079200 "Joint Sealants."
2. Seal horizontal and vertical joints between adjacent metal composite material wall panels with manufacturer's standard gaskets.

G. Track-Support Installation: Install support assembly at locations, spacings, and with fasteners recommended by manufacturer. Use manufacturer's standard horizontal tracks and vertical drain channels that provide support and secondary drainage assembly, draining to the exterior at horizontal joints through drain tube. Attach metal composite material wall panels to tracks by interlocking panel edges with manufacturer's standard "T" clips.

1. Attach routed-and-returned flanges of wall panels to perimeter extrusions with manufacturer's standard fasteners.
2. Attach flush wall panels to perimeter extrusions by engaging panel edges and by attaching with manufacturer's standard structural silicone adhesive.
3. Install wall panels to allow individual panels to "free float" and be installed and removed without disturbing adjacent panels.
4. Do not apply sealants to joints unless otherwise indicated.

H. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal composite material panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal composite material panel manufacturer; or, if not indicated, provide types recommended in writing by metal composite material panel manufacturer.

I. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal composite material wall panel units within installed tolerance of 1/4 inch in 20 feet, non-accumulative, on level, plumb, and location lines as indicated, and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

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3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing agency to perform field tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal composite material wall panel installation, including accessories.

C. Metal composite material wall panels will be considered defective if they do not pass test and inspections.

D. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

E. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal composite material panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal composite material panel installation, clean finished surfaces as recommended by metal composite material panel manufacturer. Maintain in a clean condition during construction.

B. After metal composite material panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal composite material panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

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SECTION 075419 - POLYVINYL-CHLORIDE (PVC) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Adhered polyvinyl chloride (PVC) roofing system.
2. Vapor retarder.
3. Roof insulation.
4. Cover board.
5. Walkways.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking; and for wood-based, structural-use roof deck panels.
2. Section 077100 "Roof Specialties" for premanufactured copings and roof edge flashings.
3. Section 077129 "Manufactured Roof Expansion Joints" for premanufactured roof expansion-joint assemblies.
4. Section 079200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

1.3 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D1079 and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

1.4 PREINSTALLATION MEETINGS

A. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site.

1. Meet with Owner, Engineer, Construction Manager, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.

3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review deck substrate requirements for conditions and finishes, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

B. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Engineer, Construction Manager, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For insulation and roof system component fasteners, include copy of FM Approvals' RoofNav listing.

B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:

1. Layout and thickness of insulation.
2. Base flashings and membrane terminations.
3. Flashing details at penetrations.
4. Tapered insulation thickness and slopes.

5. Roof plan showing orientation of steel roof deck and orientation of roof membrane, fastening spacings, and patterns for mechanically fastened roofing system.
6. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
7. Tie-in with air barrier.

C. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Manufacturer Certificates:

1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

    a. Submit evidence of compliance with performance requirements.

2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

C. Product Test Reports: For roof membrane and insulation, tests performed by independent qualified testing agency indicating compliance with specified requirements.

D. Evaluation Reports: For components of roofing system, from ICC-ES.

E. Field quality-control reports.

F. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

B. Certified statement from existing roof membrane manufacturer stating that existing roof warranty has not been affected by Work performed under this Section.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is listed in FM Approvals' RoofNav for roofing system identical to that used for this Project.

B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty includes roof membrane, base flashings, roof insulation, fasteners, cover boards, and other components of roofing system.
2. Warranty Period: 30 years from date of Substantial Completion.

B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such as roof membrane, base flashing, roof insulation, fasteners, cover boards, and walkway products, for the following warranty period:

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to

defective manufacture, fabrication, installation, or other defects in construction. Roof system and flashings shall remain watertight.

1. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
2. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746, ASTM D4272/D4272M, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.

C. Wind Uplift Resistance: Design roofing system to resist the wind uplift pressures as specified in the structural drawings and calculations, when tested according to FM Approvals 4474, UL 580, or UL 1897.

D. FM Approvals' RoofNav Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system and shall be listed in FM Approvals' RoofNav for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals Certification markings.

1. Fire/Windstorm Classification: Class 1A-90.
2. Hail-Resistance Rating: FM Global Property Loss Prevention Data Sheet 1-34 SH.

E. SPRI's Directory of Roof Assemblies Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system and shall be listed in SPRI's Directory of Roof Assemblies for roof assembly identical for that specified for this Project.

1. Wind Uplift Load Capacity: 90 psf.

F. Energy Performance: Roofing system shall have an initial solar reflectance of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.

2.2 POLYVINYL CHLORIDE (PVC) ROOFING

A. PVC Sheet: ASTM D4434/D4434M, Type III, fabric reinforced.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Carlisle Syntec Systems.
   b. GAF.
   c. Johns Manville; a Berkshire Hathaway company.
   d. Sika Sarnafil; Sika Corporation.
   e. Soprema, Inc.

2. Thickness: 60 mils.
3. Exposed Face Color: Gray.

B. Source Limitations: Obtain components for roofing system from roof membrane manufacturer or manufacturers approved by roof membrane manufacturer.

2.3 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.

1. Adhesives and Sealants: Comply with VOC limits of authorities having jurisdiction.

B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet.

C. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.

D. Roof Vents: As recommended by roof membrane manufacturer.

1. Size: Not less than 4-inch diameter.

E. Bonding Adhesive: Manufacturer's standard.

F. Water-Based, Fabric-Backed Membrane Adhesive: Roofing system manufacturer's standard water-based, cold-applied adhesive formulated for compatibility and use with fabric-backed membrane roofing.

G. Low-Rise, Urethane, Fabric-Backed Membrane Adhesive: Roof system manufacturer's standard spray-applied, low-rise, two-component urethane adhesive formulated for compatibility and use with fabric-backed membrane roofing.

H. Slip Sheet: Manufacturer's standard, of thickness required for application.

I. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.

J. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.4 VAPOR RETARDER

A. Self-Adhering-Sheet Vapor Retarder: ASTM D1970/D1970M, polyethylene film laminated to layer of rubberized asphalt adhesive, minimum 40-mil total thickness; maximum permeance rating of 0.1 perm; cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor retarder manufacturer.

2.5 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by PVC roof membrane manufacturer, approved for use in FM Approvals' RoofNav listed roof assemblies.

B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Carlisle Syntec Systems.
b. Duro-Last Roofing, Inc.
c. Firestone Building Products.
d. Johns Manville; a Berkshire Hathaway company.

2. Compressive Strength: 24 psi.
3. Size: 48 by 48 inches.
4. Thickness:

a. Base Layer: 1-1/2 inches.
b. Upper Layer: As required to achieve required R-value.

C. Tapered Insulation: Provide factory-tapered insulation boards.

1. Material: Match roof insulation.
2. Minimum Thickness: 1/4 inch.
3. Slope:

a. Roof Field: 1/4 inch per foot unless otherwise indicated on Drawings.
b. Saddles and Crickets: 1/2 inch per foot unless otherwise indicated on Drawings.

2.6 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.

C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer.

D. Cover Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum board or ASTM C1278/C1278M fiber-reinforced gypsum board.

1. Thickness: 1/2 inch.
2. Surface Finish: Factory primed.

2.7 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads, approximately 3/16 inch thick and acceptable to roofing system manufacturer.

1. Size: Approximately 36 by 60 inches.
2. Color: Contrasting with roof membrane.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
4. Verify that concrete substrate is visibly dry and free of moisture, and that minimum concrete internal relative humidity is not more than 75 percent, or as recommended by roofing system manufacturer, when tested according to ASTM F2170.

    a. Test Frequency: One test probe per each 1,000 sq. ft. of roof deck, with no fewer than three test probes.
    b. Submit test reports within 24 hours of performing tests.

5. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.
6. Verify that joints in precast concrete roof decks have been grouted flush with top of concrete.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing system installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3 INSTALLATION OF ROOFING, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions, FM Approvals' RoofNav listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

C. Install roof membrane and auxiliary materials to tie into existing roofing to maintain weathertightness of transition and to not void warranty for existing roofing system.

3.4 INSTALLATION OF VAPOR RETARDER

A. Self-Adhering-Sheet Vapor Retarder: Prime substrate if required by manufacturer. Install self-adhering-sheet vapor retarder over area to receive vapor retarder, side and end lapping each sheet a minimum of 3-1/2 and 6 inches, respectively.

1. Extend vertically up parapet walls and projections to a minimum height equal to height of insulation and cover board.
2. Seal laps by rolling.

B. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing system.

3.5 INSTALLATION OF INSULATION

A. Coordinate installing roofing system components, so insulation is not exposed to precipitation or left exposed at end of workday.

B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Installation Over Concrete Decks:

1. Install base layer of insulation with joints staggered not less than 24 inches in adjacent rows.

    a. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    b. Make joints between adjacent insulation boards not more than 1/4 inch in width.
    c. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

        1) Trim insulation so that water flow is unrestricted.

d. Fill gaps exceeding 1/4 inch with insulation.
e. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
f. Loosely lay base layer of insulation units over substrate.
g. Adhere base layer of insulation to vapor retarder according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

1) Set insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

2. Install upper layers of insulation and tapered insulation with joints of each layer offset not less than 12 inches from previous layer of insulation.

a. Staggered end joints within each layer not less than 24 inches in adjacent rows.
b. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

1) Trim insulation so that water flow is unrestricted.

f. Fill gaps exceeding 1/4 inch with insulation.
g. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
h. Loosely lay each layer of insulation units over substrate.
i. Adhere each layer of insulation to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

1) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

3.6 INSTALLATION OF COVER BOARDS

A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.

1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
2. At internal roof drains, conform to slope of drain sump.

a. Trim cover board so that water flow is unrestricted.

3. Cut and fit cover board tight to nailers, projections, and penetrations.

4. Adhere cover board to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

    a. Set cover board in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

B. Install slip sheet over cover board and immediately beneath roof membrane.

3.7 INSTALLATION OF ADHERED ROOF MEMBRANE

A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.

B. Unroll roof membrane and allow to relax before installing.

C. Start installation of roofing in presence of roofing system manufacturer's technical personnel.

D. Accurately align roof membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

E. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.

F. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.

G. Apply roof membrane with side laps shingled with slope of roof deck where possible.

H. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roof membrane and sheet flashings to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.

I. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.8 INSTALLATION OF BASE FLASHING

A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.9 INSTALLATION OF WALKWAYS

A. Flexible Walkways: Install walkway products according to manufacturer's written instructions.

1. Install flexible walkways at the following locations:

   a. Perimeter of each rooftop unit.
   b. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
   c. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
   d. Top and bottom of each roof access ladder.
   e. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
   f. Locations indicated on Drawings.
   g. As required by roof membrane manufacturer's warranty requirements.

2. Provide 6-inch clearance between adjoining pads.
3. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to inspect substrate conditions, surface preparation, roof membrane application, sheet flashings, protection, and drainage components, and to furnish reports to Engineer.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Engineer, and to prepare inspection report.

C. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.11 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing system for

deterioration and damage, describing its nature and extent in a written report, with copies to Engineer and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.12 ROOFING INSTALLER'S WARRANTY

A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner: _____.
2. Address: _____.
3. Building Name/Type: _____.
4. Address: _____.
5. Area of Work: _____.
6. Acceptance Date: _____.
7. Warranty Period: _____.
8. Expiration Date: _____.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period Roofing Installer will, at Roofing Installer's own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

    a. Lightning.
    b. Peak gust wind speed exceeding 140.
    c. Fire.
    d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition.
    e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work.
    f. Vapor condensation on bottom of roofing.

g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.

1. Authorized Signature: _____.
2. Name: _____.
3. Title: _____.

END OF SECTION 075419

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SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Formed roof-drainage sheet metal fabrications.
2. Formed low-slope roof sheet metal fabrications.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking.
2. Section 077129 “Manufactured Roof Expansion Joints.”
3. Section 077100 "Roof Specialties" for manufactured copings, roof-edge specialties, roof-edge drainage systems, reglets, and counterflashings.
4. Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
5. Section 079513.13 "Interior Expansion Joint Cover Assemblies" for manufactured expansion-joint cover assemblies for interior floors, walls, and ceilings.

1.3 COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
3. Review requirements for insurance and certificates if applicable.
4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each of the following

1. Underlayment materials.
2. Elastomeric sealant.
3. Butyl sealant.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
10. Include details of special conditions.
11. Include details of connections to adjoining work.
12. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches.

C. Samples: For each exposed product and for each color and texture specified, 12 inches long by actual width.

D. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI/FM 4435/ES-1 tested and FM Approvals approved.

C. Product Test Reports: For each product, for tests performed by a qualified testing agency.

D. Evaluation Reports: For copings and roof edge flashing, from ICC-ES showing compliance with ANSI/SPRI/FM 4435/ES-1.

E. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

B. Special warranty.

1.8 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1. For copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested and FM Approvals approved, shop shall be listed as able to fabricate required details as tested and approved.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
2. Protect stored sheet metal flashing and trim from contact with water.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.10 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. SPRI Wind Design Standard: Manufacture and install copings and roof edge flashings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:

1. Design Pressure: As indicated on Drawings.

D. FM Approvals Listing: Manufacture and install copings roof edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with name of fabricator and design approved by FM Approvals.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.

1. Exposed Coil-Coated Finish:

a. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Color: As selected by Engineer from manufacturer's full range.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. ATAS International, Inc.
    b. Carlisle WIP Products; a brand of Carlisle Construction Materials.
    c. GCP Applied Technologies Inc.
    d. Henry Company; a Carlisle company.
    e. Owens Corning.
    f. Polyglass U.S.A., Inc.
    g. Protecto Wrap Company.
    h. SDP Advanced Polymer Products Inc.

2. Source Limitations: Obtain underlayment from single source from single manufacturer.
3. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F or lower.

2.4 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

C. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

D. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

E. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187/D1187M.

F. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.

2.5 FABRICATION, GENERAL

A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.

1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances:

1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
2. Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.

C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

D. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

E. Seams:

1. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.

F. Do not use graphite pencils to mark metal surfaces.

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Copings: Fabricate in minimum 96-inch long, but not exceeding 12-foot long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, fasten and seal watertight. Shop fabricate interior and exterior corners.

1. Coping Profile: Fig. 3-4E in accordance with SMACNA's "Architectural Sheet Metal Manual."
2. Joint Style: Butted with expansion space and 6-inch- wide, concealed backup plate.

3. Fabricate from the following materials:

    a. Aluminum: 0.050 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT

A. Self-Adhering, High-Temperature Sheet Underlayment:

1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
2. Prime substrate if recommended by underlayment manufacturer.
3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.
5. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller.
6. Roll laps and edges with roller.
7. Cover underlayment within 14 days.

3.3 INSTALLATION, GENERAL

A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.

1. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of sealant.
3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.

5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
8. Do not field cut sheet metal flashing and trim by torch.
9. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum and stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated.

a. Embed hooked flanges of joint members not less than 1 inch into sealant.
b. Form joints to completely conceal sealant.
c. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.
d. Adjust setting proportionately for installation at higher ambient temperatures.

1) Do not install sealant-type joints at temperatures below 40 deg F.

2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

3.4 INSTALLATION OF ROOF FLASHINGS

A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.

1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.

2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Copings:

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
2. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for specified FM Approvals' listing for required windstorm classification.

3.5 INSTALLATION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 CLEANING

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean off excess sealants.

3.7 PROTECTION

A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.

C. Maintain sheet metal flashing and trim in clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Engineer.

END OF SECTION 076200

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SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Copings.
2. Roof-edge drainage systems.
3. Reglets and counterflashings.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for downspout guards and downspout boots.
2. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking.
3. Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
4. Section 079200 "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

C. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Engineer, Owner's insurer if applicable, roofing-system testing and inspecting agency representative, roofing Installer, roofing-system manufacturer's representative, Installer, structural-support Installer, and installers whose work interfaces with or affects roof specialties, including installers of roofing materials and accessories.
2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
3. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof specialties.

1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.
2. Include details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
3. Indicate profile and pattern of seams and layout of fasteners, cleats, clips, and other attachments.
4. Detail termination points and assemblies, including fixed points.
5. Include details of special conditions.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

B. Product Certificates: For each type of roof specialty.

C. Product Test Reports: For copings and roof-edge flashings, for tests performed by a qualified testing agency.

D. Sample Warranty: For manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are FM Approvals listed for specified class and SPRI ES-1 tested to specified design pressure.

B. Source Limitations: Obtain roof specialties approved by manufacturer providing roofing-system warranty specified in Section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.

B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof-specialty installation.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify profiles and tolerances of roof-specialty substrates by field measurements before fabrication and indicate measurements on Shop Drawings.

B. Coordination: Coordinate roof specialties with flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. FM Approvals' Listing: Manufacture and install copings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with FM Approvals' markings.

C. SPRI Wind Design Standard: Manufacture and install copings tested according to SPRI ES-1 and capable of resisting the following design pressures:

1. Design Pressure: As required by code .

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COPINGS

A. Metal Copings: Manufactured coping system consisting of metal coping cap in section lengths not exceeding 12 feet, concealed anchorage; with corner units, end cap units, and concealed splice plates with finish matching coping caps.

1. Formed Aluminum Sheet Coping Caps: Aluminum sheet, 0.050 inch thick thickness as required to meet performance requirements.

    a. Surface: Smooth, flat finish.
    b. Finish: Three-coat fluoropolymer.
    c. Color: As selected by Engineer from manufacturer's full range.

2. Corners: Factory mitered and mechanically clinched and sealed watertight.
3. Special Fabrications: Two-way sloped coping cap.
4. Coping-Cap Attachment Method: face leg hooked to continuous cleat with back leg fastener exposed, fabricated from coping-cap material.

    a. Face-Leg Cleats: Concealed, continuous stainless steel.

2.3 ROOF-EDGE DRAINAGE SYSTEMS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Architectural Products Company.
2. Berger Building Products, Inc.
3. Perimeter Systems; a division of SAF.

B. Downspouts: Plain rectangular complete with mitered elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.

1. Formed Aluminum: 0.063 inch thick.

C. Parapet Scuppers: Manufactured with closure flange trim to exterior, 4-inch- wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof.

1. Formed Aluminum: 0.032 inch thick.

D. Conductor Heads: Manufactured conductor heads, each with flanged back and stiffened top edge, and of dimensions and shape indicated, complete with outlet tube that nests into upper end of downspout.

1. Formed Aluminum: 0.032 inch thick.

E. Aluminum Finish: Two-coat fluoropolymer.

1. Color: As selected by Engineer from manufacturer's full range.

2.4 REGLETS AND COUNTERFLASHINGS

A. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:

1. Formed Aluminum: 0.024 inch thick.

2. Corners: Factory mitered and mechanically clinched and sealed watertight.
3. Masonry Type, Embedded: Provide reglets with offset top flange for embedment in masonry mortar joint.

B. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches and in lengths not exceeding 12 feet designed to snap into reglets and compress against base flashings with joints lapped, from the following exposed metal:

1. Formed Aluminum: 0.024 inch thick.

C. Accessories:

1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.
2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

D. Aluminum Finish: Two-coat fluoropolymer.

1. Color: As selected by Engineer from manufacturer's full range.

2.5 MATERIALS

Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

A. Aluminum Extrusions: ASTM B221, alloy and temper recommended by manufacturer for type of use and finish indicated, finished as follows:

2.6 UNDERLAYMENT MATERIALS

A. Slip Sheet: Rosin-sized building paper, 3-lb/100 sq. ft. minimum.

2.7 MISCELLANEOUS MATERIALS

A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.

B. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

C. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.

2.8 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Coil-Coated Galvanized-Steel Sheet Finishes:

1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with ASTM A755/A755M and coating and resin manufacturers' written instructions.

a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.

C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT

A. Slip Sheet: Install with tape or adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

3.3 INSTALLATION, GENERAL

A. Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder,

protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise indicated on Drawings.
2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for copper. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.4 INSTALLATION OF COPINGS

A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor copings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

1. Interlock face-leg drip edge into continuous cleat anchored to substrate at manufacturer's required spacing that meets performance requirements. Anchor back leg of coping with screw fasteners and elastomeric washers at manufacturer's required spacing that meets performance requirements.

3.5 INSTALLATION OF ROOF-EDGE SPECIALITIES

A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.6 INSTALLATION OF ROOF-EDGE DRAINAGE-SYSTEM

A. Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.

B. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c.

1. Provide elbows at base of downspouts at grade to direct water away from building.
2. Connect downspouts to underground drainage system indicated.

C. Splash Pans: Install where downspouts discharge on low-slope roofs.

D. Parapet Scuppers: Install scuppers through parapet where indicated. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

1. Anchor scupper closure trim flange to exterior wall and seal or solder to scupper.
2. Loosely lock front edge of scupper with conductor head.
3. Seal or solder exterior wall scupper flanges into back of conductor head.

E. Conductor Heads: Anchor securely to wall with elevation of conductor top edge 1 inch below scupper discharge.

3.7 INSTALLATION OF REGLETS AND COUNTERFLASHINGS

A. Coordinate installation of reglets and counterflashings with installation of base flashings.

B. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 inches over top edge of base flashings.

C. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches and bed with butyl sealant. Fit counterflashings tightly to base flashings.

3.8 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

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SECTION 077129 - MANUFACTURED ROOF EXPANSION JOINTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Flanged bellows-type roof expansion joints.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wooden curbs or cants for mounting roof expansion joints.
2. Section 076200 "Sheet Metal Flashing and Trim" for shop- and field-fabricated sheet metal expansion-joint systems, flashing, and other sheet metal items.
3. Section 077200 "Roof Accessories" for manufactured and prefabricated metal roof curbs.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roof expansion joints.

1. Include plans, elevations, sections, and attachment details.
2. Include details of splices, intersections, transitions, fittings, method of field assembly, and location and size of each field splice.
3. Provide isometric drawings of intersections, terminations, changes in joint direction or planes, and transition to other expansion joint systems depicting how components interconnect with each other and adjacent construction to allow movement and achieve waterproof continuity.

C. Samples: For each exposed product and for each color specified, 6 inches in size.

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1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Installer of roofing membrane.

1.7 WARRANTY

A. Special Warranty: Manufacturer and Installer agree to repair or replace roof expansion joints and components that leak, deteriorate beyond normal weathering, or otherwise fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof expansion joints that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than five Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint seals, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 FLANGED BELLOWS-TYPE ROOF EXPANSION JOINTS

A. Flanged Bellows-Type Roof Expansion Joint: Factory-fabricated, continuous, waterproof, joint cover consisting of exposed membrane bellows laminated to flexible, closed-cell support foam, and secured along each edge to 3- to 4-inch- wide metal flange.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Architectural Art Manufacturing; a division of Pittcon Architectural Metals, LLC.
    b. Balco; a CSW Industrials Company.
    c. Construction Specialties, Inc.
    d. Johns Manville; a Berkshire Hathaway company.
    e. MM Systems Corporation.
    f. Nystrom, Inc.
    g. Watson Bowman Acme Corp.
    h. Sika.

2. Source Limitations: Obtain flanged bellows-type roof expansion joints approved by roofing manufacturer and that are part of roofing membrane warranty.
3. Joint Movement Capability: Plus and minus 50 percent of joint size.
4. Bellows: PVC flexible membrane, nominal 60 mils thick.
5. Flanges: Stainless steel, 0.019 inch thick.
6. Configuration: Roof to wall as indicated on Drawings.
7. Corner, Intersection, and Transition Units: Provide factory-fabricated units for corner and joint intersections and horizontal and vertical transitions including those to other building expansion joints.
8. Cover Membrane: PVC flexible membrane, factory laminated to bellows and covering entire joint assembly and curbs.

    a. Color: Grey.

9. Accessories: Provide splicing units, adhesives, and other components as recommended by roof-expansion-joint manufacturer for complete installation.
10. Secondary Seal: Continuous, waterproof membrane within joint and attached to substrate on sides of joint below the primary bellows assembly.

    a. Drain-Tube Assemblies: Equip secondary seal with drain tubes and seals to direct collected moisture to exterior-wall expansion joint cover.
    b. Thermal Insulation: Fill space above secondary seal with manufacturer's standard, factory-installed mineral-fiber insulation; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E84.

B. Materials:

1. Stainless-Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.
2. PVC Membrane: ASTM D4434/D4434M, type standard with manufacturer for application.

2.3 MISCELLANEOUS MATERIALS

A. Adhesives: As recommended by roof-expansion-joint manufacturer.

B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to withstand design loads.

C. Mineral-Fiber Blanket: ASTM C665.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joint openings, substrates, and expansion-control joint systems that interface with roof expansion joints, for suitable conditions where roof expansion joints will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for handling and installing roof expansion joints.

1. Anchor roof expansion joints securely in place, with provisions for required movement. Use fasteners, protective coatings, sealants, and miscellaneous items as required to complete roof expansion joints.
2. Install roof expansion joints true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
3. Provide for linear thermal expansion of roof expansion joint materials.
4. Provide uniform profile of roof expansion joint throughout its length; do not stretch or squeeze membranes.
5. Provide uniform, neat seams.
6. Install roof expansion joints to fit substrates and to result in watertight performance.

B. Directional Changes: Install factory-fabricated units at directional changes to provide continuous, uninterrupted, and watertight joints.

C. Transitions to Other Expansion-Control Joint Assemblies: Coordinate installation of roof expansion joints with other exterior expansion-control joint assemblies specified in Section 079100 "Preformed Joint Seals" to result in watertight performance. Install factory-fabricated units at transitions between roof expansion joints and exterior expansion-control joint systems.

D. Splices: Splice roof expansion joints to provide continuous, uninterrupted, and waterproof joints.

E. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

END OF SECTION 077129

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SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Roof curbs.
2. Equipment supports.
3. Roof walkways.
4. Roof screens:

    a. Aluminum Support Framing: For direct attachment of screening panels to mechanical equipment; no base or curb required unless shown otherwise on drawings.
    b. Sliding panels to permit easy access to mechanical equipment for servicing.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for metal vertical ladders, ships' ladders, and stairs for access to roof hatches.
2. Section 077100 "Roof Specialties" for manufactured fasciae, copings, gravel stops, gutters and downspouts, and counterflashing.

1.3 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof accessories.

1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.

1.5 DELEGATED-DESIGN SUBMITTALS

A. Fo Roof Screen wall indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail mounting, securing, and flashing of roof-mounted items to roof structure. Indicate coordinating requirements with roof membrane system. Provide a design / detail for the rooftop screen to the roof deck.
2. Wind-Restraint Details: Detail fabrication and attachment of wind restraints. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:

1. Size and location of roof accessories specified in this Section.
2. Method of attaching roof accessories to roof or building structure.
3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
4. Required clearances.

B. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

1.8 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested according to ASTM D2244.

b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. Wind-Restraint Performance: As indicated on Drawings.

2.2 ROOF CURBS

A. Roof Curbs: Internally reinforced roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings, bearing continuously on roof structure, and capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, straight sides, integral metal cant, stepped integral metal cant raised the thickness of roof insulation, and integrally formed deck-mounting flange at perimeter bottom.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Adaptable Air Products.
b. LMCurbs.
c. Roof Curb Systems.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Supported Load Capacity: Coordinate load capacity with information on Shop Drawings of equipment to be supported.

D. Material: Aluminum sheet, 0.125 inch thick.

1. Finish: Two-coat fluoropolymer.
2. Color: As selected by Engineer from manufacturer's full range.

E. Construction:

1. Curb Profile: Manufacturer's standard compatible with roofing system.
2. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
3. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.

4. Top Surface: Level top of curb, with roof slope accommodated by sloping deck-mounting flange or by use of leveler frame.
5. Sloping Roofs: Where roof slope exceeds 1:48, fabricate curb with perimeter curb height tapered to accommodate roof slope so that top surface of perimeter curb is level. Equip unit with water diverter or cricket on side that obstructs water flow.
6. Insulation: Factory insulated with 1-1/2-inch- thick glass-fiber board insulation.
7. Liner: Same material as curb, of manufacturer's standard thickness and finish.
8. Nailer: Factory-installed wood nailer along top flange of curb under top flange on side of curb, continuous around curb perimeter.
9. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb, of size and spacing required to meet wind uplift requirements.
10. Platform Cap: Where portion of roof curb is not covered by equipment, provide weathertight platform cap formed from 3/4-inch- thick plywood covered with metal sheet of same type, thickness, and finish as required for curb.
11. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as curb.

2.3 EQUIPMENT SUPPORTS

A. Equipment Supports: Internally reinforced perimeter metal equipment supports capable of supporting superimposed live and dead loads between structural supports, including equipment loads and other construction indicated on Drawings, spanning between structural supports; capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, and integrally formed structure-mounting flange at bottom.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Curbs Plus, Inc.
    b. Custom Solution Roof and Metal Products.
    c. LMCurbs.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Supported Load Capacity: Coordinate load capacity with information on Shop Drawings of equipment to be supported.

D. Material: Aluminum sheet, 0.125 inch thick.

1. Finish: Two-coat fluoropolymer.
2. Color: As selected by Engineer from manufacturer's full range.

E. Construction:

1. Curb Profile: Manufacturer's standard compatible with roofing system.
2. Insulation: Factory insulated with 1-1/2-inch- thick glass-fiber board insulation.
3. Liner: Same material as equipment support, of manufacturer's standard thickness and finish.

4. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb of size and spacing required to meet wind uplift requirements.
5. Platform Cap: Where portion of equipment support is not covered by equipment, provide weathertight platform cap formed from 3/4-inch- thick plywood covered with metal sheet of same type, thickness, and finish as required for curb.
6. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as equipment support.
7. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
8. Fabricate equipment supports to minimum height of 12 inches above roofing surface unless otherwise indicated.
9. Sloping Roofs: Where roof slope exceeds 1:48, fabricate each support with height to accommodate roof slope so that tops of supports are level with each other. Equip supports with water diverters or crickets on sides that obstruct water flow.
10. Security Grille: Provide where indicated on Drawings.

2.4 ROOF SCREEN

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. City Scapes Architectural Innovations; Envisor.
   b. Or equal.

B. Design Criteria:

   1. Frames: 6063 T6 extruded aluminum.
   2. Screen: Vertical Corrugated metal.
   3. Screen Heights: 52 inches.
   4. Color: Slate gray.
   5. Removable Screen Sections: as required.

2.5 METAL MATERIALS

A. Aluminum Sheet: ASTM B209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.

   1. Exposed Coil-Coated Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

      a. Two-Coat Fluoropolymer Finish: AAMA 2605. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight.

   2. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.

B. Aluminum Extrusions and Tubes: ASTM B221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used; otherwise mill finished.

C. Steel Shapes: ASTM A36/A36M, hot-dip galvanized according to ASTM A123/A123M unless otherwise indicated.

D. Steel Tube: ASTM A500/A500M, round tube.

E. Galvanized-Steel Tube: ASTM A500/A500M, round tube, hot-dip galvanized according to ASTM A123/A123M.

F. Steel Pipe: ASTM A53/A53M, galvanized.

2.6 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

C. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:

1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A153/A153M or ASTM F2329.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.

D. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

E. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

2.7 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Verify dimensions of roof openings for roof accessories.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.
3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.

C. Roof Curb Installation: Install each roof curb so top surface is level.

D. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.

E. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A780/A780M.

B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 099113 "Exterior Painting."

C. Clean exposed surfaces according to manufacturer's written instructions.

D. Clean off excess sealants.

E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

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SECTION 079100 - PREFORMED JOINT SEALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Preformed, foam joint seals.

B. Related Requirements:

1. Section 079200 "Joint Sealants" for liquid sealants applied over preformed seals in dual seal systems.

1.3 ACTION SUBMITTALS

A. Product Data: For each preformed joint seal product.

B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each type and color of preformed joint seal required, provide Samples with joint seals in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint seals.

D. Preformed Joint Seal Schedule: Include the following information:

1. Joint seal location and designation.
2. Joint width and movement capability.
3. Joint seal manufacturer and product name.
4. Joint seal color.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each preformed joint seal for tests performed by manufacturer and witnessed by a qualified testing agency.

B. Warranties: For special warranties.

1.5 QUALITY ASSURANCE

A. Mockups: Install mockups of assemblies specified in other Sections that are indicated to receive preformed joint seals specified in this Section. Use materials and installation methods specified in this Section.

1.6 WARRANTY

A. Special Warranty: Installer agrees to repair or replace preformed joint seals that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish preformed joint seals to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PREFORMED, FOAM JOINT SEALS

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

1. Construction Specialties: Model VF-200.
2. EMSEAL; a Sika Company: Seismic Colorseal.
3. MM Systems Corporation: ColorJoint ESS.
4. Watson Bowman Acme Corporation: Wabo SeismicWeatherSeal.
5. Willseal LLC, part of Tremco CPG: Willseal Seismic.

B. Preformed, Foam Joint Seals (PTS-1): Manufacturer's standard joint seal manufactured from urethane or EVA (ethylene vinyl acetate) foam with minimum density of 10 lb/cu. ft. and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths based on design criteria indicated, with factory- or field-applied adhesive for bonding to substrates.

1. Design Criteria:

a. Nominal Joint Width: As indicated on Drawings.
b. Movement Capability: -25 percent/+25 percent.

2. Joint Seal Color: As selected by Engineer from full range of industry colors.

2.2 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by preformed-joint-seal manufacturer for joint substrates indicated.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to preformed joint seal manufacturer, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces; and formulated to promote best adhesion to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with preformed joint seals and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive preformed joint seals, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting preformed-joint seal performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing preformed joint seals to comply with preformed joint seal manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of preformed joint seal, including dust, paints (except for permanent protective coatings tested and approved for seal adhesion and compatibility by seal manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimal bond with preformed joint seals. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Exterior insulation and finish systems.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint seals. Nonporous joint substrates include the following:

    a. Metal.

b. Glass.
c. Porcelain enamel.
d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by preformed joint seal manufacturer or as indicated by tests or prior experience. Apply primer to comply with joint seal manufacturer's written instructions. Confine primers to areas of joint seal bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of adhesive or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION

A. General: Comply with preformed joint seal manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Installation of Preformed, Foam Joint Seals:

1. Install each length of seal immediately after removing protective wrapping.
2. Firmly secure compressed joint seals to joint gap side to obtain full bond using exposed pressure-sensitive adhesive or field-applied adhesive as recommended by manufacturer.
3. Do not pull or stretch material. Produce seal continuity at splices, ends, turns, and intersections of joints.
4. For applications at low ambient temperatures, heat foam joint seal material in compliance with manufacturer's written instructions.

3.4 PROTECTION

A. Protect preformed joint seals from damage resulting from construction operations or other causes so seals are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated seals immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079100

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SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Nonstaining silicone joint sealants.
2. Urethane joint sealants.
3. Butyl joint sealants.

B. Related Requirements:

1. Section 079100 "Preformed Joint Seals" for preformed compressible foam and precured joint seals.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Product Test Reports: For each kind of joint sealant, for tests performed by a qualified testing agency.

C. Preconstruction Laboratory Test Schedule: Include the following information for each joint sealant and substrate material to be tested:

1. Joint-sealant location and designation.
2. Manufacturer and product name.
3. Type of substrate material.
4. Proposed test.

D. Preconstruction Field-Adhesion-Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.

E. Field-Adhesion-Test Reports: For each sealant application tested.

F. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

B. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: Qualified according to ASTM C1021 to conduct the testing indicated.

1.7 PRECONSTRUCTION TESTING

A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Adhesion Testing: Use ASTM C794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Compatibility Testing: Use ASTM C1087 to determine sealant compatibility when in contact with glazing and gasket materials.
3. Stain Testing: Use ASTM C1248 to determine stain potential of sealant when in contact with masonry substrates.
4. Submit manufacturer's recommended number of pieces of each type of material, including joint substrates, joint-sealant backings, and miscellaneous materials.
5. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
6. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures, including use of specially formulated primers.

7. Testing will not be required if joint-sealant manufacturers submit data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, staining of, and compatibility with joint substrates and other materials matching those submitted.

1.8 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.9 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Engineer from manufacturer's full range.

2.2 NONSTAINING SILICONE JOINT SEALANTS

A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C1248.

B. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 50, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Pecora Corporation.
    b. Sika Corporation; Joint Sealants.
    c. The Dow Chemical Company.
    d. Tremco Incorporated.

2.3 URETHANE JOINT SEALANTS

A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. BASF Corporation.
    b. Bostik, Inc.
    c. Pecora Corporation.
    d. Sika Corporation; Joint Sealants.
    e. Tremco Incorporated.

2.4 BUTYL JOINT SEALANTS

A. Butyl-Rubber-Based Joint Sealants: ASTM C1311.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Bostik, Inc.
    b. Pecora Corporation.

2.5 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Corporation.
b. Construction Foam Products; a division of Nomaco, Inc.

B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin) Type O (open-cell material) Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean, porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.
    d. Exterior insulation and finish systems.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Porcelain enamel.
    d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C1193 unless otherwise indicated.

3.4 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:

   a. Perform 10 tests for the first 1,000 feet of joint length for each kind of sealant and joint substrate.
   b. Perform one test for each 1,000 feet of joint length thereafter or one test per each floor per elevation.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.

   a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

3. Inspect tested joints and report on the following:

a. Whether sealants filled joint cavities and are free of voids.
b. Whether sealant dimensions and configurations comply with specified requirements.
c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.

4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.

1. Joint Locations:

a. Isolation and contraction joints in cast-in-place concrete slabs.
b. Joints between plant-precast architectural concrete paving units.
c. Tile control and expansion joints.
d. Joints between different materials listed above.
e. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, M, P, 50, T, NT.
3. Joint-Sealant Color: As selected by Engineer from manufacturer's full range of colors.

B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

a. Construction joints in cast-in-place concrete.
b. Joints between plant-precast architectural concrete units.
c. Control and expansion joints in unit masonry.
d. Joints in dimension stone cladding.
e. Joints in glass unit masonry assemblies.
f. Joints in exterior insulation and finish systems.
g. Joints between metal panels.
h. Joints between different materials listed above.
i. Perimeter joints between materials listed above and frames of doors windows and louvers.
j. Control and expansion joints in ceilings and other overhead surfaces.
k. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
3. Joint-Sealant Color: As selected by Engineer from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

a. Control and expansion joints on exposed interior surfaces of exterior walls.
b. Tile control and expansion joints.
c. Vertical joints on exposed surfaces of unit masonry walls and partitions.
d. Joints on underside of plant-precast structural concrete beams and planks.
e. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, S, NS, 25, NT.
3. Joint-Sealant Color: As selected by Engineer from manufacturer's full range of colors.

D. Joint-Sealant Application: Concealed mastics.

1. Joint Locations:

a. Aluminum thresholds.
b. Sill plates.
c. Other joints as indicated on Drawings.

2. Joint Sealant: Butyl-rubber based.
3. Joint-Sealant Color: As selected by Engineer from manufacturer's full range of colors.

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SECTION 079513.13 - INTERIOR EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes interior expansion joint cover assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for expansion joint cover assemblies.

B. Shop Drawings: For each expansion joint cover assembly.

1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams showing entire route of each expansion joint.
2. Where expansion joint cover assemblies change planes, provide isometric or clearly detailed drawing depicting how components interconnect.

C. Samples for Initial Selection: For each type of exposed finish.

1. Include manufacturer's color charts showing the full range of colors and finishes available for each exposed metal and elastomeric-seal material.

D. Samples for Verification: For each type of expansion joint cover assembly, full width by 6 inches long in size.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each fire-resistance-rated expansion joint cover assembly, for tests performed by manufacturer and witnessed by a qualified testing agency.

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PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Furnish units in longest practicable lengths to minimize field splicing.

B. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Expansion joint cover assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

B. Fire-Resistance Ratings: Provide expansion joint cover assemblies with fire barriers identical to those of systems tested for fire resistance according to UL 2079 by a qualified testing agency.

1. Hose Stream Test: Wall-to-wall and wall-to-ceiling assemblies shall be subjected to hose stream testing.

C. Expansion Joint Design Criteria:

1. Type of Movement: Thermal and Wind sway.

a. Nominal Joint Width: As indicated on Drawings.
b. Minimum Joint Width: As indicated on Drawings.
c. Maximum Joint Width: As indicated on Drawings.

2. Type of Movement: Seismic.

a. Joint Movement: As indicated on Drawings.

2.3 FLOOR EXPANSION JOINT COVERS

A. Seismic-Pan Floor Joint Cover: Seismic pan assembly with sloped sides allowing extension of unit above floor plane during joint contraction and equipped with springs to return unit back into alignment during joint expansion. Provide manufacturer's recommended sealant at pan edge.

1. Application: New floor to existing floor.
2. Installation: Recessed.
3. Pan Recess Depth: As required to accommodate adjacent flooring.

B. Basis-of-Design: Series.

2.4 WALL EXPANSION JOINT COVERS

A. Dual-Elastomeric-Seal Wall Joint Cover: Assembly consisting of dual-elastomeric seals and center plate anchored to frames fixed to sides of joint gap.

1. Application: Intersections of walls, corners, and ceilings.
2. Fire-Resistance Rating: Not less than that of adjacent construction.
3. Exposed Metal:

    a. Aluminum: Mill.

        1) Color: As selected by Engineer from full range of industry colors and color densities.

4. Seal: Preformed elastomeric membranes or extrusions.

    a. Color: As selected by Engineer from manufacturer's full range.

5. Basis-of-Design:

    a. Wall to Wall and Ceiling to Ceiling.
    b. Wall to Corner and Wall to Ceiling.

2.5 MATERIALS

A. Aluminum: ASTM B221, Alloy 6063-T5 for extrusions; ASTM B209, Alloy 6061-T6 for sheet and plate.

1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.

B. Elastomeric Seals: Manufacturer's standard preformed elastomeric membranes or extrusions to be installed in metal frames.

C. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint and to comply with performance criteria for required fire-resistance rating.

D. Moisture Barrier: Manufacturer's standard, flexible elastomeric material.

E. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 ACCESSORIES

A. Manufacturer's standard attachment devices. Include anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces where expansion joint cover assemblies will be installed for installation tolerances and other conditions affecting performance of the Work.

B. Notify Engineer where discrepancies occur that will affect proper expansion joint cover assembly installation and performance.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to expansion joint cover assembly manufacturer's written instructions.

B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion joint cover assemblies. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of expansion joint cover assemblies.

3.3 INSTALLATION

A. Comply with manufacturer's written instructions for storing, handling, and installing expansion joint cover assemblies and materials unless more stringent requirements are indicated.

B. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.

1. Repair or grout block out as required for continuous frame support using nonmetallic, shrinkage-resistant grout.
2. Install frames in continuous contact with adjacent surfaces.
    a. Shimming is not permitted.
3. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
4. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
5. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.

C. Seals: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.

1. Provide in continuous lengths for straight sections.

2. Seal transitions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

D. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.

E. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.

F. Fire-Resistance-Rated Assemblies: Coordinate installation of expansion joint cover assembly materials and associated work so complete assemblies comply with performance requirements.

1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.

3.4 PROTECTION

A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.

B. Protect the installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install temporary protection over expansion joint cover assemblies. Reinstall cover plates or seals prior to Substantial Completion.

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Division 08

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SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Interior standard steel doors and frames.
2. Exterior standard steel doors and frames.

B. Related Requirements:

1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.
2. Section 099113 “Exterior Painting” for field painting of hollow-metal doors and frames.

C. Iron and steel products supplied under this section must comply with the American Iron and Steel provisions of the Contract.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.4 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, temperature-rise ratings, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
7. Details of anchorages, joints, field splices, and connections.
8. Details of accessories.
9. Details of moldings, removable stops, and glazing.

C. Samples for Initial Selection: For hollow-metal doors and frames with factory-applied color finishes.

D. Samples for Verification:

1. Finishes: For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches.
2. Fabrication: Prepare Samples approximately 12 by 12 inches to demonstrate compliance with requirements for quality of materials and construction:

a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow-metal panels and glazing if applicable.

E. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

F. American Iron and Steel (AIS): Submit certification indicating compliance with AIS requirements for all metal products.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For door inspector.

1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, Section 5.2.3.1.

2. Egress Door Inspector: Submit documentation of compliance with NFPA 101, Section 7.2.1.15.4.
3. Submit copy of DHI Fire and Egress Door Assembly Inspector (FDAI) certificate.

B. Product Test Reports: For each type of fire-rated hollow-metal door and frame assembly, fire-rated borrowed-lite assembly, and thermally rated door assemblies for tests performed by a qualified testing agency indicating compliance with performance requirements.

C. Oversize Construction Certification: For assemblies required to be fire-rated and exceeding limitations of labeled assemblies.

D. Field quality control reports.

E. Florida Regulatory Approvals: Provide copy of current, valid statewide product approval for product, material or system as shown on the drawings and as specified in this section, in accordance with Rule 9N-3. Product approval shall be for the specific manufacturer, product type, model or style, and the State Approval Number.

1.8 CLOSEOUT SUBMITTALS

A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ceco Door; AADG, Inc.; ASSA ABLOY.
2. Curries, AADG, Inc.; ASSA ABLOY Group.
3. Steelcraft; Allegion plc.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated on Drawings, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
2. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 degrees F above ambient after 30 minutes of standard fire-test exposure.

B. Fire-Rated, Borrowed-Lite Assemblies: Assemblies complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

C. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.61 when tested according to ASTM C518.

2.3 INTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level B. At locations indicated in the Door and Frame Schedule.

1. Doors:

   a. Type: As indicated in the Door and Frame Schedule.
   b. Thickness: 1-3/4 inches.
   c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch.
   d. Edge Construction: Model 2, Seamless.
   e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
   f. Core: Polyisocyanurate Vertical steel stiffener.
   g. Fire-Rated Core: Manufacturer's standard laminated mineral board core for fire-rated and temperature-rise-rated doors.

2. Frames:

   a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch.
   b. Frames: Fabricated from same thickness material as adjacent door frame.
   c. Construction: Full profile welded.

3. Exposed Finish: Prime.

2.4 EXTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A. At locations indicated in the Door and Frame Schedule.

1. Doors:

   a. Type: As indicated in the Door and Frame Schedule.
   b. Thickness: 1-3/4 inches.
   c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
   d. Edge Construction: Model 2, Seamless.
   e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
   f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
   g. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
   h. Core: Polyisocyanurate Vertical steel stiffener.
   i. Fire-Rated Core: Manufacturer's standard vertical steel stiffener with insulation core for fire-rated doors.

2. Frames:

   a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
   b. Construction: Full profile welded.

3. Exposed Finish: Prime.

2.5 HOLLOW-METAL PANELS

A. Provide hollow-metal panels of same materials, construction, and finish as adjacent door assemblies.

2.6 FRAME ANCHORS

A. Jamb Anchors:

1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.

3. Post Installed Expansion Anchor: Minimum 3/8-inch- diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.

B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

C. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot dip galvanized according to ASTM A153/A153M, Class B.

2.7 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.

D. Inserts, Bolts, and Fasteners: Hot dip galvanized according to ASTM A153/A153M.

E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

F. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

G. Glazing: Comply with requirements in Section 088000 "Glazing."

2.8 FABRICATION

A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.

1. Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to ANSI/SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

D. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Provide stops and moldings flush with face of door, and with beveled stops unless otherwise indicated.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.
4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
5. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

2.9 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

B. Factory Finish: Clean, pretreat, and apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, complying with ANSI/SDI A250.3.

1. Color and Gloss: Match Engineer's sample.

PART 3 - EXECUTION

3.1 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.

B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.

    a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
    b. Install frames with removable stops located on secure side of opening.

2. Fire-Rated Openings: Install frames according to NFPA 80.
3. Floor Anchors: Secure with post installed expansion anchors.

    a. Floor anchors may be set with power-actuated fasteners instead of post installed expansion anchors if so indicated and approved on Shop Drawings.

4. Solidly pack mineral-fiber insulation inside frames.
5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
6. In-Place Concrete, precast panels, or Masonry Construction: Secure frames in place with post installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.

1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8.
2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors according to NFPA 105.

D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Engineer.

B. Inspections:

1. Fire-Rated Door Inspections: Inspect each fire-rated door according to NFPA 80, Section 5.2.
2. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements according to NFPA 101, Section 7.2.1.15.

C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 and NFPA 101.

3.4 REPAIR

A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

C. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

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SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Solid-core flush wood doors with plastic-laminate-faces.
2. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Requirements:

1. Section 087100 "Door Hardware" for door hardware in flush wood doors.
2. Iron and steel products supplied under this section must comply with the American Iron and Steel provisions of the Contract.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product, including the following:

1. Door core materials and construction.
2. Door edge construction
3. Door face type and characteristics.
4. Door frame construction.
5. Factory-machining criteria.
6. Factory- finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:

1. Door schedule indicating door and frame location, type, size, fire protection rating, and swing.
2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
3. Details of frame for each frame type, including dimensions and profile.

4. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
5. Dimensions and locations of blocking for hardware attachment.
6. Dimensions and locations of mortises and holes for hardware.
7. Clearances and undercuts.
8. Doors to be factory finished and application requirements.
9. Apply AWI Quality Certification Program label to Shop Drawings.

C. Samples for Initial Selection: For factory-finished doors and factory-finished door frames.

D. Samples for Verification:

1. Polymer edging, in manufacturer's standard colors.
2. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.
3. Frames for light openings, 6 inches long, for each material, type, and finish required.

E. American Iron and Steel (AIS): Submit certification indicating compliance with AIS requirements for all metal products.

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Special warranties.

B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.7 QUALITY ASSURANCE

A. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheeting.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until building is enclosed and weathertight, wet work is complete, and HVAC system is operating and maintaining

temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during remainder of construction period.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace doors and frames that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Delamination of veneer.
b. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors and frames.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain flush wood doors from single manufacturer.

1. Manufacturer: Provide products by one of the following:

a. VT Industries, Inc.
b. Marshfield Doors Systems, Inc.
c. Mohawk Flush Doors, Inc.; a Masonite Company

2.2 FLUSH WOOD DOORS AND FRAMES, GENERAL

A. Quality Standard: In addition to requirements specified, comply with AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with the Contract Documents in addition to those of the referenced quality standard.

2.3 SOLID-CORE FIVE-PLY FLUSH WOOD DOORS FOR OPAQUE FINISH

A. Interior Solid-Core Doors:

1. Performance Grade: ANSI/WDMA I.S. 1A Extra Heavy Duty.
2. Architectural Woodwork Standards Grade: Premium.
3. Faces: Hardboard or MDF.

a. Apply MDO to directly to high-density hardboard crossbands.
b. Hardboard Faces: ANSI A135.4, Class 1 (tempered) or Class 2 (standard).
c. MDF Faces: ANSI A208.2, Grade 150 or Grade 160.

4. Core for Non-Fire-Rated Doors:

a. ANSI A208.1, Grade LD-1 particleboard.

1) Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.
2) Provide doors with glued-wood-stave or WDMA I.S. 10 structural-composite-lumber cores instead of particleboard cores for doors scheduled to receive exit devices in Section 087100 "Door Hardware."

b. Glued wood stave.
c. WDMA I.S. 10 structural composite lumber.

1) Screw Withdrawal, Door Face: 550 lbf.
2) Screw Withdrawal, Vertical Door Edge: 550 lbf.

d. Either glued wood stave or WDMA I.S. 10 structural composite lumber.

5. Construction: Five plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.

2.4 LIGHT FRAMES

A. Metal Frames for Openings: Manufacturer's standard frame formed of 0.048-inch- thick, cold-rolled steel sheet; factory primed for paint with baked-enamel- or powder-coated finish; and approved for use in doors of fire-protection rating indicated on Drawings.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated.

1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
2. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied.

1. Locate hardware to comply with DHI-WDHS-3.
2. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.
3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
4. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.
5. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Openings: Factory cut and trim openings through doors.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."
3. Louvers: Factory install louvers in prepared openings.
4. Flash top of out swinging doors with manufacturer's standard metal flashing.

2.6 FACTORY PRIMING

A. Doors for Opaque Finish: Factory prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer specified in Section 099123" Interior Painting."

2.7 FACTORY FINISHING

A. Comply with referenced quality standard for factory finishing.

1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
2. Finish faces, all four edges, edges of cutouts, and mortises.
3. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Factory finish doors.

C. Opaque Finish:

1. Grade: Premium.
2. Finish: Architectural Woodwork Standards System-10, UV Curable, Water Based.
3. Finish: Architectural Woodwork Standards System-11, Polyurethane, Catalyzed.
4. Finish: ANSI/WDMA I.S. 1A OP-6 Catalyzed Polyurethane.
5. Color: As selected by Engineer from manufacturer's full range.
6. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Section 087100 "Door Hardware."

B. Install doors and frames to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

C. Install frames level, plumb, true, and straight.

1. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
2. Anchor frames to anchors or blocking built in or directly attached to substrates.

    a. Secure with countersunk, concealed fasteners and blind nailing.
    b. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.

        1) For factory-finished items, use filler matching finish of items being installed.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

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SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Aluminum-framed entrance and storefront systems.

B. Related Requirements:

1. Section 088000 “Glazing.”

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data:

1. Aluminum-framed entrance and storefront systems.

B. Shop Drawings:

1. Plans, elevations, sections, full-size details, and attachments to other work.
2. Details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
3. Full-size isometric details of each type of vertical-to-horizontal intersection of aluminum-framed entrance and storefront systems, showing the following:

    a. Joinery, including concealed welds.
    b. Anchorage.
    c. Expansion provisions.
    d. Glazing.
    e. Flashing and drainage.

4. Connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

C. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of exposed finish.

D. Samples for Verification: Actual sample of finished products for each type of exposed finish.

E. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:

1. Joinery, including concealed welds.
2. Anchorage.
3. Expansion provisions.
4. Glazing.
5. Flashing and drainage.

F. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

G. Delegated Design Submittals: For aluminum-framed entrances and storefront systems, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Energy Performance Certificates: For aluminum-framed entrance and storefront systems, accessories, and components, from manufacturer.

1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront system.

B. Product Test Reports: For aluminum-framed entrance and storefront systems, for tests performed by a qualified testing agency.

C. Quality-Control Program: Developed specifically for Project, including fabrication and installation, in accordance with recommendations in ASTM C1401. Include periodic quality-control reports.

D. Sample Warranties: For aluminum-framed entrance and storefront systems.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For aluminum-framed entrance and storefront systems.

B. Maintenance Data for Structural Sealant: For structural-sealant-glazed storefront. Include ASTM C1401 recommendations for post-installation-phase quality-control program.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:

1. Fabricator of products.
2. Entity that employs installers and supervisors who are trained and approved by manufacturer.
3. Authorized representative who is trained and approved by manufacturer.
4. Entity that is certified under the North American Contractor Certification Program (NACC) and that employs installers and supervisors who are trained and approved by manufacturer.

B. Testing Agency Qualifications: Qualified in accordance with ASTM E699 for testing indicated and accredited by IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC 17025 and acceptable to Owner and Engineer.

C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not change intended aesthetic effects, as judged solely by Engineer, except with Engineer's approval. If changes are proposed, submit comprehensive explanatory data to Engineer for review.

D. Structural-Sealant Glazing: Comply with ASTM C1401 for design and installation of storefront systems that include structural glazing.

1.8 MOCKUPS

A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects and to set quality standards for fabrication and installation.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrance and storefront systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures, including but not limited to, excessive deflection.
b. Faulty operation of operating components.

2. Warranty Period: 10 years from date of Substantial Completion.

B. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested in accordance with ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D 4214.
c. Cracking, peeling, or chipping.

2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain all components of aluminum-framed entrance and storefront system, including framing spandrel panels and accessories, from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrance and storefront systems representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Aluminum-framed entrance and storefront systems to withstand movements of supporting structure, including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Failure also includes the following:

a. Thermal stresses transferring to building structure.
b. Glass breakage.
c. Noise or vibration created by wind and thermal and structural movements.
d. Loosening or weakening of fasteners, attachments, and other components.
e. Failure of operating units.

B. Structural Loads:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.

C. Deflection of Framing Members Supporting Glass: At design wind load, as follows:

1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans of up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches.
2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.

    a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.

3. Cantilever Deflection: Limited to 2L/175 at unsupported cantilevers.

D. Structural: Test in accordance with ASTM E330/E330M as follows:

1. When tested at positive and negative wind-load design pressures, storefront assemblies, including entrance doors, do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, storefront assemblies, including entrance doors and anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

E. Water Penetration under Static Pressure: Test in accordance with ASTM E331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas, including entrance doors, when tested in accordance with a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..

F. Seismic Performance: Aluminum-framed entrance and storefront systems to withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.

1. Seismic Drift Causing Glass Fallout: Complying with criteria for passing based on building occupancy type when tested in accordance with AAMA 501.6 at design displacement and 1.5 times the design displacement.

G. Energy Performance: Certified and labeled by manufacturer for energy performance as follows:

1. Thermal Transmittance (U-factor):

    a. Fixed Glazing and Framing Areas: U-factor for the system of not more than 0.41 as determined in accordance with NFRC 100.
    b. Entrance Doors: U-factor of not more than 0.70 as determined in accordance with NFRC 100.

2. Solar Heat-Gain Coefficient (SHGC):

    a. Fixed Glazing and Framing Areas: SHGC for the system of not more than 0.26 as determined in accordance with NFRC 200.

b. Entrance Doors: SHGC of not more than0.23 as determined in accordance with NFRC 200.

3. Air Leakage:

a. Fixed Glazing and Framing Areas: Air leakage for the system of not more than 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft. when tested in accordance with ASTM E283.
b. Entrance Doors: Air leakage of not more than 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.

H. Noise Reduction: Test in accordance with ASTM E90, with ratings determined by ASTM E1332, as follows.

1. Outdoor-Indoor Transmission Class: Minimum 34.

I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested in accordance with AAMA 501.5.

a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
b. Low Exterior Ambient-Air Temperature: 0 deg F.
c. Interior Ambient-Air Temperature: 75 deg F.

2.3 ALUMINUM-FRAMED ENTRANCE AND STOREFRONT SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. EFCO Corporation.
2. Kawneer North America, an Arconic company.
3. YKK AP America Inc.

B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Exterior Framing Construction: Thermally broken.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Front.
4. Finish: Clear anodic finish.
5. Fabrication Method: Field-fabricated stick system.
6. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

C. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

E. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing or automatic operation.

1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

    a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.

2. Door Design: As indicated.
3. Glazing Stops and Gaskets: Beveled , snap-on, extruded-aluminum stops and preformed gaskets.

    a. Provide nonremovable glazing stops on outside of door.

4. Finish: Match adjacent storefront framing finish.

2.4 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."

B. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door, to comply with requirements in this Section.

1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products complying with BHMA standard referenced.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
3. Opening-Force Requirements:

    a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion.
    b. Accessible Interior Doors: Not more than 5 lbf to fully open door.

C. Designations: Requirements for design, grade, function, finish, quantity, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in "Entrance Door Hardware Sets" Article.
2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.

D. Cylinders:

1. As specified in Section 087100 "Door Hardware."

E. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

F. Removable Mullions: BHMA A156.3 extruded aluminum.

1. When used with panic exit devices, provide keyed removable mullions listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing in accordance with UL 305. Use only mullions that have been tested with exit devices to be used.

G. Weather Stripping: Manufacturer's standard replaceable components.

1. Compression Type: Made of ASTM D2000 molded neoprene or ASTM D2287 molded PVC.
2. Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

H. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

I. Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

2.5 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

B. Glazing Gaskets: Comply with Section 088000 "Glazing."

C. Glazing Sealants: Comply with Section 088000 "Glazing."

D. Structural Glazing Sealants: ASTM C1184 chemically curing silicone formulation that is compatible with system components with which it comes in contact; specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in storefront system indicated.

1. Color: Black.

E. Weatherseal Sealants: ASTM C920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other

system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed storefront manufacturers for this use.

1. Color: Match structural sealant.

2.6 MATERIALS

A. Sheet and Plate: ASTM B209.

B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.

C. Structural Profiles: ASTM B308/B308M.

D. Steel Reinforcement:

1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.

2.7 ACCESSORIES

A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A123/A123M or ASTM A153/A153M requirements.

C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

D. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil thickness per coat.

2.8 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or metal panels.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.

F. Storefront Framing: Fabricate components for assembly using screw-spline system.

G. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At interior and exterior doors, provide compression weather stripping at fixed stops.

H. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

I. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

J. After fabrication, clearly mark components to identify their locations in Project in accordance with Shop Drawings.

2.9 ALUMINUM FINISHES

A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

1. Color: Black.

2.10 SOURCE QUALITY CONTROL

A. Structural Sealant: Perform quality-control procedures complying with ASTM C1401 recommendations, including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF ALUMINUM-FRAMED ENTRANCE AND STOREFRONT SYSTEMS

A. Comply with manufacturer's written instructions.

B. Do not install damaged components.

C. Fit joints to produce hairline joints free of burrs and distortion.

D. Rigidly secure nonmovement joints.

E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

F. Seal perimeter and other joints watertight unless otherwise indicated.

G. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

H. Set continuous sill members and flashing in full sealant bed, as specified in Section 079200 "Joint Sealants," to produce weathertight installation.

I. Install components plumb and true in alignment with established lines and grades.

J. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

K. Install entrance doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware in accordance with entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

L. Install glazing as specified in Section 088000 "Glazing."

3.3 ERECTION TOLERANCES

A. Install aluminum-framed entrance and storefront systems to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
3. Alignment:

    a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
    b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
    c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.

4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests.

B. Tests: Perform the following tests on representative areas of aluminum-framed entrance and storefront systems.

1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Engineer to be tested in accordance with AAMA 501.2 and to not evidence water penetration.

    a. Perform a minimum of two tests in areas as directed by Engineer.

2. Air Leakage: ASTM E783 at 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article but not more than 0.09 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.

    a. Perform a minimum of two tests in areas as directed by Engineer.

3. Structural-Sealant Adhesion: Test structural sealant in accordance with recommendations in ASTM C1401, Destructive Test Method A, "Hand Pull Tab (Destructive)," Appendix X2.

    a. Test a minimum of two areas on each building facade.
    b. Repair installation areas damaged by testing.

C. Aluminum-framed entrance and storefront systems will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 MAINTENANCE SERVICE

A. Entrance Door Hardware Maintenance:

1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.
2. Initial Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of entrance door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Use parts and supplies that are the same as those used in the manufacture and installation of original equipment.

END OF SECTION 084113

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SECTION 085113 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Aluminum windows.

B. Related Requirements:

1. Section 084113 "Aluminum-Framed Entrances and Storefronts" for coordinating finish among aluminum fenestration units.
2. Section 088000 “Glazing” for glass of aluminum windows.

1.3 DEFINITIONS

A. Combination Assemblies: An assembly formed by a combination of two or more separate fenestration products whose frames are mulled together utilizing a combination mullion or reinforcing mullion.

B. Combination Mullions: A horizontal or vertical member formed by joining two or more individual fenestration units together without a mullion stiffener.

C. Reinforcing Mullions: A horizontal or vertical member with an added continuous mullion stiffener and joining two or more individual fenestration units along the sides of the mullion stiffener.

1.4 COORDINATION

A. Finish Matching: Coordinate all exposed exterior aluminum components and trim to ensure uniform and consistent color and appearance. Use products specified in this Section as a benchmark. Engineer's decision will be final as to whether a proposed product matches.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review and discuss finishing of aluminum windows that is required to be coordinated with finishing of other aluminum work for color and finish matching.
3. Review, discuss, and coordinate interrelationship of aluminum windows with other exterior wall components. Include provisions for anchoring, flashing, weeping, sealing perimeters, and protecting finishes.
4. Review and discuss sequence of work required to construct a watertight and weathertight exterior building envelope.
5. Inspect and discuss condition of substrate and other preparatory work performed by other trades.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes.

B. Shop Drawings:

1. Plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

C. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of exposed finish.

D. Samples for Verification: Actual sample of finished products for each type of exposed finish:

1. Exposed Aluminum Finishes: 2 by 4 inches.

E. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

F. Delegated Design Submittals: For reinforcing mullions, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

A. Test and Evaluation Reports:

1. Product Test Reports: For each aluminum window, for tests performed by qualified testing agency.

B. Qualification Statements: For manufacturer and Installer.

C. Delegated Design Engineer Qualifications: For reinforcing mullions.

D. Sample warranties.

1.8 CLOSEOUT SUBMITTALS

A. Warranty Documentation:

1. Manufacturers' special warranties.

1.9 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.

B. Installer Qualifications: Authorized representative who is trained and approved by aluminum window manufacturer.

C. Testing Agency Qualifications: An FGIA-accredited testing agency for testing indicated.

1.10 MOCKUPS

A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver aluminum windows to Project site in original, unopened packages and store them in accordance with manufacturer's written instructions. Protect aluminum windows against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Handle aluminum windows in a manner that prevents damage before, during, and after installation.

1.12 FIELD CONDITIONS

A. Environmental Limitations: Do not install aluminum windows outside of limits recommended in writing by manufacturer.

1.13 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Failure to meet performance requirements.
    b. Structural failures, including excessive deflection, water leakage, condensation, and air infiltration.
    c. Faulty operation of movable sash and hardware.
    d. Deterioration of materials and finishes beyond normal weathering.
    e. Failure of insulating glass.

2. Warranty Period:

    a. Window: 10 years from date of Substantial Completion.
    b. Glazing Units: 10 years from date of Substantial Completion.
    c. Hardware: Three years from date of Substantial Completion.
    d. Aluminum Finish: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain aluminum windows from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Window Certification: FGIA certified with label attached to each window.

B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:

1. Minimum Performance Class: As indicated on Drawings.
2. Minimum Performance Grade: As indicated on Drawings.
3. Mulled Window Systems: Evaluate and rate combination assemblies as single systems as determined by AAMA 450 in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 requirements.

C. Energy Performance: Certified and labeled by manufacturer for energy performance as follows:

1. Thermal Transmittance (U-factor): As determined in accordance with NFRC 100:

    a. Fixed Windows: Not more than. 0.46.
    b. Operable Windows: Not more than. 0.46.

2. Solar Heat-Gain Coefficient (SHGC): As determined in accordance with NFRC 200:

    a. Fixed Windows: Not more than 0.30.

b. Operable Windows: Not more than 0.30 as determined in accordance with NFRC 200.

D. Thermal Movements: Provide aluminum windows, including anchorage, which allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F ambient; 180 deg F material surfaces.

E. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 4 for enhanced protection.

1. Large-Missile Test: For glazing located within 30 ft. of grade.
2. Small-Missile Test: For glazing located more than 30 ft. above grade.

2.3 ALUMINUM WINDOWS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. EFCO Corporation.
2. Kawneer Company, Inc.; Arconic Corporation.
3. YKK AP America Inc.

B. Provide manufacturer's standard aluminum window assemblies consisting of frames, sashes, glass, hardware, fasteners, and all components and accessories as required for a complete installation.

C. Operating Types: Provide the following operating types in locations indicated on Drawings:

1. Fixed.

D. Frames and Sashes: Aluminum extrusions of alloy, temper, and strength complying with AAMA/WDMA/CSA 101/I.S.2/A440.

1. Thermally Broken Construction: Fabricate frames, sashes, and muntins with an integral, concealed, low-conductance thermal barrier located between exterior materials and window members exposed on interior side in a manner that eliminates direct metal-to-metal contact.

E. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.

F. Weather Stripping: Provide manufacturer's standard full-perimeter weather stripping for each operable sash unless otherwise indicated.

G. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Avoid exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

H. Mullions: Provide manufacturer's standard combination and reinforcing mullions and cover plates matching window units, complete with anchors for support to structure. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide reinforcing mullions and cover plates capable of withstanding design wind loads of window units.

2.4 ACCESSORIES

A. Subsills: Thermally broken, extruded-aluminum subsills in configurations indicated on Drawings.

B. Interior Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

C. Panning Trim: Profiles in sizes and configurations indicated on Drawings.

D. Nail Fins: Manufacturer's standard mounting flanges with holes pre-punched for mechanical fasteners.

2.5 FABRICATION

A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

B. Glaze aluminum windows in the factory.

C. Weather strip each operable sash to provide weathertight installation.

D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.

E. Provide water-shed members above side-hinged sashes and similar lines of natural water penetration.

F. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.6 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA AMP 500 "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

1. Color: Black.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.

C. Examine wall flashings, vapor retarders, air and weather barriers, and other built-in components to ensure weathertight window installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.

C. Mullions: Install combination and reinforcing mullions for combination assemblies in accordance with manufacturer's written instructions.

D. Install windows and components to drain water passing joints and condensation to the exterior.

E. Separate aluminum from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing Services: Testing and inspection of installed windows as follows:

1. Testing Methodology: Testing of windows for air infiltration and water resistance in accordance with AAMA 502.
2. Air-Infiltration Testing:

    a. Test Pressure: As required to determine compliance in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 for performance class indicated.
    b. Allowable Air-Leakage Rate: 1.5 times the applicable AAMA/WDMA/CSA 101/I.S.2/A440 rate for product type and performance class rounded down to one decimal place.

3. Water-Resistance Testing:

    a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated.
    b. Allowable Water Infiltration: No water penetration.

4. Testing Extent: Three windows of each type as selected by Engineer and a qualified independent testing and inspecting agency. Windows will be tested immediately after installation.
5. Test Reports: Prepared in accordance with AAMA 502.

C. Tests and Inspections:

1. Windows will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.4 ADJUSTING

A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.

3.5 CLEANING AND PROTECTION

A. Clean exposed surfaces immediately after installing windows using manufacturer's written instructions. Avoid damaging finishes. Remove excess sealants, glazing materials, dirt, and other substances.

B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

C. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately in accordance with manufacturer's written instructions.

END OF SECTION 085113

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SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Mechanical door hardware for the following:

    a. Swinging doors.

2. Cylinders for door hardware specified in other Sections.
3. Electrified door hardware.

B. Related Requirements:

1. Section 081113 "Hollow Metal Doors and Frames" for astragals provided as part of labeled fire-rated assemblies and for door silencers provided as part of hollow-metal frames.
2. Section 081416 "Flush Wood Doors" for provided as part of labeled fire-rated assemblies.

1.3 COORDINATION

A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

B. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

C. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

D. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

E. New hardware shall match or be compatible in function, finish, and manufacturer to existing where possible. Contractor shall confirm existing conditions and coordinate with Architect and Owner prior to submittals.

F. All cylinders and keying shall be coordinated with the Owner’s existing keying system. Provide keyed-alike groups and master keying per Owner direction.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Conference participants shall include Installer's Architectural Hardware Consultant and Owner's security consultant.

B. Keying Conference: Conduct conference at Project site.

1. Conference participants shall include Installer's Architectural Hardware Consultant and Owner's security consultant.
2. Incorporate conference decisions into keying schedule after reviewing door hardware keying system including, but not limited to, the following:

a. Flow of traffic and degree of security required.
b. Preliminary key system schematic diagram.
c. Requirements for key control system.
d. Requirements for access control.
e. Address for delivery of keys.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For electrified door hardware.

1. Include diagrams for power, signal, and control wiring.
2. Include details of interface of electrified door hardware and building safety and security systems.

C. Samples: For each exposed product in each finish specified, in manufacturer's standard size.

1. Tag Samples with full product description to coordinate Samples with door hardware schedule.

D. Samples for Initial Selection: For each type of exposed finish.

E. Samples for Verification: For each type of exposed product, in each finish specified.

1. Sample Size: Full-size units or minimum 2-by-4-inch Samples for sheet and 4-inch long Samples for other products.

    a. Full-size Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.

2. Tag Samples with full product description to coordinate Samples with door hardware schedule.

F. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Submittal Sequence: Submit door hardware schedule after or concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
3. Content: Include the following information:

    a. Identification number, location, hand, fire rating, size, and material of each door and frame.
    b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
    c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
    d. Description of electrified door hardware sequences of operation and interfaces with other building control systems.
    e. Fastenings and other installation information.
    f. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
    g. Mounting locations for door hardware.
    h. List of related door devices specified in other Sections for each door and frame.

G. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and Architectural Hardware Consultant.

B. Product Certificates: For each type of electrified door hardware.

1. Certify that door hardware for use on each type and size of labeled fire-rated doors complies with listed fire-rated door assemblies.

C. Product Test Reports: For compliance with accessibility requirements, for tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.

D. Field quality-control reports.

E. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of door hardware to include in maintenance manuals.

B. Schedules: Final door hardware and keying schedule.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Engineer, and Owner about door hardware and keying.

1. Warehousing Facilities: In Project's vicinity.
2. Scheduling Responsibility: Preparation of door hardware and keying schedule.
3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as an Architectural Hardware Consultant (AHC) and an Electrified Hardware Consultant (EHC).

1.9 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

D. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including excessive deflection, cracking, or breakage.
b. Faulty operation of doors and door hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Three years from date of Substantial Completion unless otherwise indicated below:

a. Electromagnetic and Delayed-Egress Locks: Five years from date of Substantial Completion.
b. Exit Devices: Two years from date of Substantial Completion.
c. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of door hardware from single manufacturer.

1. Provide electrified door hardware from same manufacturer as mechanical door hardware unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

B. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that complies with requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.

1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. at the tested pressure differential of 0.3-inch wg of water.

C. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

E. Accessibility Requirements: For door hardware on doors in an accessible route, comply with California Accessibility Standards.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
2. Comply with the following maximum opening-force requirements:

a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
b. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.
5. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

2.3 HINGES

A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

2.4 SELF-CLOSING HINGES AND PIVOTS

A. Self-Closing Hinges and Pivots: BHMA A156.17.

2.5 CONTINUOUS HINGES

A. Continuous Hinges: BHMA A156.26; minimum 0.120-inch thick, hinge leaves with minimum overall width of 4 inches; fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete.

B. Continuous, Gear-Type Hinges: Extruded-aluminum, pinless, geared hinge leaves joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating thrust bearings.

2.6 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: As indicated in door hardware schedule.

B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Bored Locks: Minimum 1/2-inch latchbolt throw.
2. Mortise Locks: Minimum 3/4-inch latchbolt throw.

3. Deadbolts: Minimum 1.25-inch bolt throw.

C. Lock Backset: 2-3/4 inches unless otherwise indicated.

D. Lock Trim:

1. Description: As indicated on Drawings.
2. Levers: Forged.
3. Escutcheons (Roses): Forged.
4. Dummy Trim: Match lever lock trim and escutcheons.

E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
4. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.

F. Bored Locks: BHMA A156.2; Grade 1; Series 4000.

G. Mortise Locks: BHMA A156.13; Security Grade 1; stamped steel case with steel or brass parts; Series 1000.

2.7 AUXILIARY LOCKS

A. Bored Auxiliary Locks: BHMA A156.36: Grade 1; with strike that suits frame.

B. Mortise Auxiliary Locks: BHMA A156.36; Grade 1; with strike that suits frame.

C. Narrow Stile Auxiliary Locks: BHMA A156.36; Grade 1; with strike that suits frame.

2.8 ELECTRIC STRIKES

A. Electric Strikes: BHMA A156.31; Grade 1; with faceplate to suit lock and frame.

2.9 ELECTROMECHANICAL LOCKS

A. Electromechanical Locks: BHMA A156.25; Grade 1; motor or solenoid driven; with strike that suits frame.

1. Type: Mortise deadbolt.

2.10 EXIT LOCKS AND EXIT ALARMS

A. Exit Locks and Alarms: BHMA A156.29, Grade 1.

2.11 SURFACE BOLTS

A. Surface Bolts: BHMA A156.16.

2.12 MANUAL FLUSH BOLTS

A. Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch throw; designed for mortising into door edge.

2.13 AUTOMATIC AND SELF-LATCHING FLUSH BOLTS

A. Automatic Flush Bolts: BHMA A156.3, Type 25; minimum 3/4-inch throw; with dust-proof strikes; designed for mortising into door edge. Include wear plates.

2.14 EXIT DEVICES AND AUXILIARY ITEMS

A. Exit Devices and Auxiliary Items: BHMA A156.3.

2.15 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver. Provide cylinder from same manufacturer of locking devices.

B. Standard Lock Cylinders: BHMA A156.5; Grade 1 permanent cores; face finished to match lockset.

1. Core Type: Interchangeable.

C. High-Security Lock Cylinders: BHMA A156.30; Grade 1 permanent cores that are removable; face finished to match lockset.

1. Type: E, electrical.

D. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.

E. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.16 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, appendix. Provide one extra key blank for each lock. Incorporate decisions made in keying conference.

1. No Master Key System: Only change keys operate cylinders.

a. Provide three cylinder change keys.

2. Master Key System: Change keys and a master key operate cylinders.

a. Provide three cylinder change keys and five master keys.

3. Grand Master Key System: Change keys, a master key, and a grand master key operate cylinders.

a. Provide three cylinder change keys and five each of master and grand master keys.

4. Great-Grand Master Key System: Change keys, a master key, a grand master key, and a great-grand master key operate cylinders.

a. Provide three cylinder change keys and five each of master, grand master, and great-grand master keys.

5. Existing System:

a. Master key or grand master key locks to Owner's existing system.
b. Re-key Owner's existing master key system into new keying system.

6. Keyed Alike: Key all cylinders to same change key.

B. Keys: Nickel silver.

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

a. Notation: "DO NOT DUPLICATE."

2.17 KEY CONTROL SYSTEM

A. Key Control Cabinet: BHMA A156.28; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, two sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 150 percent of the number of locks.

1. Wall-Mounted Cabinet: Grade 1 cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock.

B. Key Lock Boxes: Designed for storage of two keys.

C. Key Control System Software: Multiple-index system for recording and reporting key-holder listings, tracking keys and lock and key history, and printing receipts for transactions. Include instruction manual.

D. All cylinders and keying shall be coordinated with the Owner’s existing keying system. Provide keyed-alike groups and master keying per Owner direction.

2.18 OPERATING TRIM

A. Operating Trim: BHMA A156.6; stainless steel unless otherwise indicated.

2.19 ACCESSORIES FOR PAIRS OF DOORS

A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release.

B. Carry-Open Bars: BHMA A156.3; prevent the inactive leaf from opening before the active leaf; provide polished brass or bronze carry-open bars with strike plate for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.

C. Astragals: BHMA A156.22.

2.20 SURFACE CLOSERS

A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

2.21 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: BHMA A156.16.

2.22 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

B. Maximum Air Leakage: When tested according to ASTM E283 with tested pressure differential of 0.3-inch wg, as follows:

1. Smoke-Rated Gasketing: 0.3 cfm/sq. ft. of door opening.
2. Gasketing on Single Doors: 0.3 cfm/sq. ft. of door opening.
3. Gasketing on Double Doors: 0.50 cfm per ft. of door opening.

2.23 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

2.24 METAL PROTECTIVE TRIM UNITS

A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- thick aluminum; with manufacturer's standard machine or self-tapping screw fasteners.

2.25 AUXILIARY DOOR HARDWARE

A. Auxiliary Hardware: BHMA A156.16.

2.26 AUXILIARY ELECTRIFIED DOOR HARDWARE

A. Auxiliary Electrified Door Hardware:

2.27 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rating labels and as otherwise approved by Engineer.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Fire-Rated Applications:

a. Wood or Machine Screws: For the following:

1) Hinges mortised to doors or frames; use threaded-to-the-head wood screws for wood doors and frames.
2) Strike plates to frames.

3) Closers to doors and frames.

b. Steel Through Bolts: For the following unless door blocking is provided:

1) Surface hinges to doors.
2) Closers to doors and frames.
3) Surface-mounted exit devices.

3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.28 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Provide consistent finish on locksets, closers, stops, and push/pull hardware.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

B. Wood Doors: Comply with door and hardware manufacturers' written instructions.

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule, but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches of door height greater than 90 inches.

E. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as directed by Owner.

F. Key Control System:

1. Key Control Cabinet: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
2. Key Lock Boxes: Install where indicated or approved by Engineer to provide controlled access for fire and medical emergency personnel.
3. Key Control System Software: Set up multiple-index system based on final keying schedule.

G. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Engineer.

1. Configuration: Provide one power supply for each door opening with electrified door hardware.

H. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

I. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

J. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

1. Do not notch perimeter gasketing to install other surface-applied hardware.

K. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

L. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 FIELD QUALITY CONTROL

A. Independent Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
2. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 70 degrees and so that closing time complies with accessibility requirements of authorities having jurisdiction.
3. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.

B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Maintenance Service: Beginning at Substantial Completion, maintenance service shall include six months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door and door hardware operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.8 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain door hardware.

3.9 DOOR HARDWARE SCHEDULE

Set: 1.0 – EXTERIOR SINGLE HM UTILITY / STORAGE

Doors: DA-102, DA-120

Qty	Description	Catalog Number	Finish	Mfr
1	Continuous Hinge	CFM x Height Required x SLI-HD1 —		PE
1	Storeroom Lock	10 8204 LNL	US32D	SA
1	Surface Closer	281 CPS	EN	SA
1	Kick Plate	K1050 10" x 2" LDW BEV CSK	US32D	RO
1	Threshold	2005AT	—	PE
1	Rain Guard	346C + 4" Overall Door Width	—	PE
1	Gasketing	2891AV	—	PE
1	Door Sweep	345CNB	—	PE
1	Position Switch	DPS-M-BK	—	SU

Set: 2.0 – EXTERIOR ALSF PAIR VESTIBULE ENTRY

Doors: DA-117
Note: Exit devices to be dogged during designated hours for push/pull function. Coordinate with store-front submittals for compatibility.

Qty	Description	Catalog Number	Finish	Mfr
2	Continuous Hinge	CFM x Height Required x SLI-HD1	—	PE

1	Mullion	L980A x Cyl to Match Facility Key	US28	SA
1	Rim Exit Device	10 8804 Less Pull (Nightlatch)	US32D	SA
1	Rim Exit Device	8810 EO (Exit Only)	US32D	SA
2	Door Pull	RM3310-36	US32D	RO
2	Surface Closer	281 CPS	EN	SA
1	Threshold	2005AT	—	PE
1	Perimeter Seals	By Aluminum Storefront Manufacturer	—	OT
2	Door Sweep	345CNB	—	PE
1	Position Switch	DPS-M-BK	—	SU

Set: 3.0 – OFFICE FUNCTION WD

Doors: DA-112, DA-110, DA-115, DA-118

Qty	Description	Catalog Number	Finish	Mfr
3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Office/Entry Lock	10 8205 LNL	US32D	SA
1	Surface Closer	1431 O	EN	SA
1	Kick Plate	K1050 10" x 2" LDW BEV CSK	US32D	RO
1	Wall Stop	406	US32D	RO
3	Silencer	608-RKW	—	RO

Set: 4.0 – PRIVACY WD

Doors: DA-111, DA-119

Qty	Description	Catalog Number	Finish	Mfr
3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Privacy Lock	49 8265 LNL	US32D	SA
1	Surf Overhead Stop	10-436	630	RF
1	Surface Closer	281 O	EN	SA
1	Kick Plate	K1050 10" x 2" LDW BEV CSK	US32D	RO
1	Mop Plate	K1050 6" x 1" LDW CSK BEV	US32D	RO
3	Silencer	608-RKW	—	RO

Set: 5.0 – STOREROOM FUNCTION WD/HM OUTSWINGING

Doors: DA-105, DA-107

Qty	Description	Catalog Number	Finish	Mfr
3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	10 8204 LNL	US32D	SA
1	Surface Closer	1431 CPS	EN	SA

1	Kick Plate	K1050 10" x 2" LDW BEV CSK	US32D	RO
3	Silencer	608-RKW	—	RO

Set: 6.0 – ALSF CLASSROOM FUNCTION WD/HM

Doors: DA-100, DA-101, DA-108, DA-121, DA-122, DA-106

Qty	Description	Catalog Number	Finish	Mfr
3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Lock	10 8237 LNL	US32D	SA
1	Surface Closer	1431 O	EN	SA
1	Wall Stop	406	US32D	RO
1	Perimeter Seals	By Aluminum Storefront Manufacturer	—	OT

Set: 7.0 – INTERIOR SINGLE WD

Doors: DA-113

Qty	Description	Catalog Number	Finish	Mfr
3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	10 8204 LNL	US32D	SA
1	Surface Closer	281 CPS	EN	SA
1	Kick Plate	K1050 10" x 2" LDW BEV CSK	US32D	RO
1	Threshold	2005AT	—	PE
1	Gasketing	2891AV	—	PE
1	Door Sweep	345CNB	—	PE
1	Position Switch	DPS-M-BK	—	SU

Set: 8.0 – EXTERIOR SINGLE HM

Doors: DA-109, DA-103

Note: Authorized credentials retract latch bolt for entry; door relocks upon closing. REX in rail allows free exit. Fail secure. Key override at all times.

Qty	Description	Catalog Number	Finish	Mfr
3	Hinge (NRP)	5BB1 4.5 x 4.5 NRP	630	IVE
1	Storeroom Lock	T581HD7 DANE	626	FAL
1	SFIC Const. Core	C607CCA	—	FAL
1	Permanent SFIC Core	80-036	626	SCH
1	OH Stop	90S	630	GLY
1	Surface Closer	4050 RW/PA	689	LCN
1	Kick Plate	8400 10" x 2" LDW	630	IVE

3	Silencer	SR64	GY	IVE

Set: 9.0 – PR - WD - EXIT DEVICE - EAC

Doors: DA-114, DA-123
Note: Door normally closed and secured. Authorized credentials retract latch bolt for entry; door relocks upon closing. REX in rail allows free exit. Fail secure. Key override at all times.

Qty	Description	Catalog Number	Finish	Mfr
3	Electric Hinge	TA2714-QCXX-1/2" x 4-1/2"	US26D	MK
1	SVR Exit Device	43 NB8710 EO (Exit Only)	US32D	SA
1	SVR Exit Device	DG1 43 55 56 NB8706 ETMD	US32D	SA
1	Surface Closer	422 CTB2 / PCTB2 as required	EN	SA
1	Kick Plate	K1050 10" x 2" LDW	US32D	RO
1	Astragal Set	18061CNB	—	PE
1	Gasketing	S88BL X LAR	—	PE
1	ElectroLynx Harness	QC-C1500 (PS to hinge/strike)	—	MK
1	ElectroLynx Harness	QC-CXXP (Lock/exit to hinge)	—	MK
1	Card Reader	By security vendor	—	OT
1	Position Switch	DPS-XXXX - WH (as required)	—	SU
1	Power Supply	AQLXX - R8E1 (size as required)	—	SU

Set: 10.0 – SHARED ACCESS OFFICE/ENTRY FUNCTION
Doors: DA-104
Note: Door between two rooms requiring mutual access and security.

Qty	Description	Catalog Number	Finish	Mfr
3	Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Office/Entry Lock	10 8205 LNL	US32D	SA
1	Surface Closer	1431 CPS	EN	SA
1	Kick Plate	K1050 10" x 2" LDW (Single) BEV CSK	US32D	RO
3	Silencer	608-RKW	—	RO

END OF SECTION 087100

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SECTION 088000 – GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Glass products.
2. Laminated glass.
3. Insulating glass.
4. Glazing sealants.
5. Glazing tapes.
6. Miscellaneous glazing materials.

B. Related Requirements:

1. Section 084113 “Aluminum-framed Entrances and Storefronts.”
2. Section 085113 “Aluminum Windows.”

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.

C. IBC: International Building Code.

D. Interspace: Space between lites of an insulating-glass unit.

1.4 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of the following products; 12 inches square.

1. Laminated glass.
2. Insulating glass.
3. Spandrel glass.

C. Glazing Accessory Samples: For sealants and colored spacers, in 12-inch lengths. Install sealant Samples between two strips of material representative in color of adjoining framing system.

D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.7 DELEGATED DESIGN SUBMITTALS

A. For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by qualified professional engineer responsible for their preparation.

1.8 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer manufacturers of fabricated glass units.

B. Product Certificates: For glass.

C. Product Test Reports: For insulating glass and glazing sealants, for tests performed by a qualified testing agency.

1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

D. Preconstruction adhesion and compatibility test report.

E. Sample Warranties: For special warranties.

1.9 QUALITY ASSURANCE

A. Fabricated-Glass Manufacturer Qualifications: A qualified manufacturer of fabricated glass units who is approved and certified by primary glass manufacturer.

B. Installer Qualifications: A qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AG&M) contractors.

C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.

E. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Install glazing in mockups specified in Section 084113 "Aluminum-Framed Entrances and Storefronts" Section 085113 "Aluminum Windows" to match glazing systems required for Project, including glazing methods.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
2. Use ASTM C1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.12 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.13 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: 10 years from date of Substantial Completion.

C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Guardian Glass; SunGuard.
2. Oldcastle Building Envelope.
3. Viracon, Inc.

B. Source Limitations for Glass: Obtain tinted and coated glass from single source from single manufacturer.

C. Source Limitations for Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined in accordance with the IBC and ASTM E1300:

1. Design Wind Pressures: As indicated on Drawings Determine design wind pressures applicable to Project in accordance with ASCE/SEI 7, based on heights above grade indicated on Drawings.

    a. Wind Design Data: As indicated on Drawings.
    b. Basic Wind Speed: As indicated on Drawings.
    c. Importance Factor: 1.0.
    d. Exposure Category: As indicated on Drawings .

2. Design Snow Loads: As indicated on Drawings.
3. Probability of Breakage for Sloped Glazing: For glass sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
4. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
5. Thermal Loads: Design glazing to resist thermal stress breakage induced by differential temperature conditions and limited air circulation within individual glass lites and insulated glazing units.

C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
4. U-Factors: Center-of-glazing values, in accordance with NFRC 100 and based on most current non-beta version of LBL's WINDOW computer program, expressed as Btu/sq. ft. x h x deg F.

5. SHGC and Visible Transmittance: Center-of-glazing values, in accordance with NFRC 200 and based on most current non-beta version of LBL's WINDOW computer program.
6. Visible Reflectance: Center-of-glazing values, in accordance with NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. NGA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the IGCC.

D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than thickness indicated.

1. Minimum Glass Thickness for Exterior Lites: 6 mm.
2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.

B. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

C. Heat-Strengthened Float Glass: ASTM C1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

D. Silicone-Coated Spandrel Glass: ASTM C1048, Type I, Condition C, Quality-Q3.

2.5 LAMINATED GLASS

A. Laminated Glass: ASTM C1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written instructions.
2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

2.6 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified in accordance with ASTM E2190.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
2. Perimeter Spacer: Manufacturer's standard spacer material and construction.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Technoform Glass Insulation North America.
2) Thermix; a brand of Ensinger USA.

3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.7 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Engineer from manufacturer's full range of industry colors.

B. Neutral-Curing Silicone Glazing Sealant, Class 100/50: Complying with ASTM C920, Type S, Grade NS, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Pecora Corporation.
b. Sika Corporation.
c. The Dow Chemical Company.

2.8 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:

1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.9 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks:

1. Neoprene with Shore A durometer hardness of 85, plus or minus 5.
2. Type recommended in writing by sealant or glass manufacturer.

D. Spacers:

1. Neoprene blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
2. Type recommended in writing by sealant or glass manufacturer.

E. Edge Blocks:

1. Neoprene with Shore A durometer hardness per manufacturer's written instructions.
2. Type recommended in writing by sealant or glass manufacturer.

F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.10 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch- minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended in writing by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

G. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

A. Immediately after installation, remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.8 MONOLITHIC GLASS SCHEDULE

A. Ultraclear Glass Type: Fully tempered float glass.

1. Basis-of-Design Product: Vitro Architectural Glass; Starphire.
2. Minimum Thickness: 6 mm.
3. Safety glazing required.

B. Silicone-coated, spandrel tempered float glass (SMG).

1. Basis-of-Design Product: Vitro Architectural Glass; Starphire.
2. Minimum Thickness: 6 mm.
3. Safety glazing required.

3.9 LAMINATED GLASS SCHEDULE

A. Tinted Laminated Glass Type: Two plies of heat-strengthened float glass.

1. Basis-of-Design Product: Vitro Architectural Glass; Starphire Solar Control Laminated Glass.
2. Conformance: ASTM C1172 and complying with testing requirements.
3. Outboard Lite: Starphire float glass as manufactured by Vitro Architectural Glass.

    a. Conformance: ASTM C1036, Type I, Class 1, Quality q3.
    b. Thickness: 6 mm (1/4").
    c. Heat-Treatment: Heat-strengthened, ASTM C1048, Kind HS.

4. Interlayer:

    a. Type: PVB.
    b. Thickness: 0.060".
    c. Color: Clear.

5. Inboard Lite: Solargray tinted float glass as manufactured by Vitro Architectural Glass.

    a. Conformance: ASTM C1036, Type I, Class 2, Quality q3.
    b. Thickness: 6 mm (1/4").
    c. Heat-Treatment: Heat-strengthened, ASTM C1048, Kind HS.
    d. Magnetic Sputter Vacuum Deposition Coating (MSVD): ASTM C1376.
    e. Coating: Solarban 70 on Surface #2.

6. Winter Nighttime U-Factor: 0.95 maximum.
7. Summer Daytime U-Factor: 0.86 maximum.
8. Visible Light Transmittance: 30 percent minimum.
9. Solar Heat Gain Coefficient: 0.25 maximum.
10. Outdoor Visible Light Reflectance: 15 percent maximum.

3.10 INSULATING GLASS SCHEDULE

A. Glass Type (ITG): Double Glazed Clear Insulating Glass Unit, Low-E.

1. Basis-of-Design Product: Vitro Architectural Glass; Solarcoat Low-E on Clear 6 mm (2) | Air 1/2" (12.7 mm) | Solarcoat Low-E on Clear 6 mm (3).
2. Conformance: ASTM E 2190.
3. Outdoor Lite: Clear float glass as manufactured by Vitro Architectural Glass.

    a. Conformance: ASTM C1036, Type 1, Class 1, Quality q3.
    b. Glass Thickness: 6 mm (1/4").
    c. Pyrolytic deposition coating: ASTM C1376.
    d. Coating: Solarcoat Low-E on Surface #3.
    e. Heat-Treatment: Tempered; ASTM C1048, Kind FT; Safety Glazing meets ANSI Z97.1 and CPSC 16CFR-1201.

4. Interspace Content: Air 1/2".

5. Indoor Lite: Clear float glass as manufactured by Vitro Architectural Glass.

    a. Conformance: ASTM C1036, Type 1, Class 1, Quality q3.
    b. Glass Thickness: 6 mm (1/4").
    c. Pyrolytic deposition coating: ASTM C1376.
    d. Coating: Solarcoat Low-E on Surface #3.
    e. Heat-Treatment: Tempered; ASTM C1048, Kind FT; Safety Glazing meets ANSI Z97.1 and CPSC 16CFR-1201.

6. Performance Requirements:

    a. Visible Light Transmittance: 68 percent minimum.
    b. Winter Nighttime U-Factor: 0.31 maximum.
    c. Summer daytime U-Factor: 0.30 maximum.
    d. Shading Coefficient: 0.70 maximum.
    e. Solar Heat Gain Coefficient: 0.61 maximum.
    f. Outdoor Visible Light Reflectance: 17 percent maximum.

END OF SECTION 088000

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SECTION 089119 - FIXED LOUVERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fixed extruded-aluminum louvers.

B. Related Requirements:

1. Section 042200 " Concrete Unit Masonry" for louvers in masonry wall.

1.3 DEFINITIONS

A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.

B. Horizontal Louver: Louver with horizontal blades (i.e., the axis of the blades are horizontal).

C. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

1. Show weep paths, gaskets, flashings, sealants, and other means of preventing water intrusion.
2. Show mullion profiles and locations.

C. Samples: For each type of metal finish required.

1.5 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.6 WARRANTY

A. Special Finish Warranty, Factory-Applied Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of baked enamel, powder coat, or organic finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain fixed louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

2.2 PERFORMANCE REQUIREMENTS

A. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width in accordance with AMCA 500-L.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

C. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

2.3 FIXED EXTRUDED-ALUMINUM LOUVERS

A. Horizontal Drainable-Blade Louver, Extruded Aluminum:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. All-Lite Architectural Products.
    b. Greenheck Fan Corporation.
    c. Pottorff.
    d. Ruskin; Air Distribution Technologies, Inc.; Johnson Controls, Inc.
    e. United Enertech Corp.

2. Louver Depth: As indicated on the louver schedule.
3. Mullion Type: Exposed.
4. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.4 LOUVER SCREENS

A. General: Provide screen at louvers indicated.

1. Screen Location for Fixed Louvers: As indicated on the louver schedule.
2. Screening Type: Bird screening, except where insect screening is indicated.

B. Secure screen frames to louver frames with machine screws with heads finished to match louver, spaced a maximum of 6 inches from each corner and at 12 inches o.c.

C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.

1. Metal: Same type and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.
2. Finish: Same finish as louver frames to which louver screens are attached.
3. Type: Rewirable frames with a driven spline or insert.

2.5 MATERIALS

A. Aluminum Extrusions: ASTM B221, Alloy 6063-T5, T-52, or T6.

B. Aluminum Sheet: ASTM B209, Alloy 3003 or 5005, with temper as required for forming, or as otherwise recommended by metal producer for required finish.

C. Fasteners: Use types and sizes to suit unit installation conditions.

1. Use tamper-resistant screws for exposed fasteners unless otherwise indicated.
2. For fastening aluminum, use aluminum or 300 series stainless steel fasteners.
3. For fastening galvanized steel, use hot-dip-galvanized-steel or 300 series stainless steel fasteners.
4. For fastening stainless steel, use 300 series stainless steel fasteners.
5. For color-finished louvers, use fasteners with heads that match color of louvers.

D. Post Installed Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, fabricated from stainless steel components, with allowable load or strength design capacities calculated in accordance with ICC-ES AC193 and ACI 318 greater than or equal to the design

load, as determined by testing in accordance with ASTM E488/E488M conducted by a qualified testing agency.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.6 FABRICATION

A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.

C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

1. Frame Type: Channel unless otherwise indicated.

D. Include supports, anchorages, and accessories required for complete assembly.

E. Provide vertical mullions of type and at spacings indicated, but not more than is recommended by manufacturer, or 72 inches o.c., whichever is less.

1. Fully Recessed Mullions: Where indicated, provide mullions fully recessed behind louver blades. Where length of louver exceeds fabrication and handling limitations, fabricate with close-fitting blade splices designed to permit expansion and contraction.
2. Semirecessed Mullions: Where indicated, provide mullions partly recessed behind louver blades, so louver blades appear continuous. Where length of louver exceeds fabrication and handling limitations, fabricate with interlocking split mullions and close-fitting blade splices designed to permit expansion and contraction.
3. Exposed Mullions: Where indicated, provide units with exposed mullions of same width and depth as louver frame. Where length of louver exceeds fabrication and handling limitations, provide interlocking split mullions designed to permit expansion and contraction.
4. Exterior Corners: Prefabricated corner units with mitered and welded blades and with fully recessed mullions at corners.

F. Provide subsills made of same material as louvers or extended sills for recessed louvers.

G. Join frame members to each other and to fixed louver blades with fillet welds concealed from view unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.7 ALUMINUM FINISHES

A. Finish louvers after assembly.

B. High-Performance Organic Finish, Two-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat.

1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Color and Gloss: As selected by Engineer from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

C. Form closely fitted joints with exposed connections accurately located and secured.

D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

E. Protect unpainted galvanized- and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.

B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.

C. Restore louvers damaged during installation and construction, so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Engineer, remove damaged units and replace with new units.

1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 089119

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SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section

1.2 SUMMARY

A. Section Includes:

1. Framing systems.
2. Suspension systems.

B. Iron and steel products supplied under this section must comply with the American Iron and Steel provisions of the Contract.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Framing systems.
2. Suspension systems.
3. Grid suspension systems.

B. American Iron and Steel (AIS): Submit certification indicating compliance with AIS requirements for all metal products

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of code-compliance certification for studs and tracks.

B. Evaluation Reports: For steel studs and runners firestop tracks, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.5 QUALITY ASSURANCE

A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Framing Industry Association or the Steel Stud Manufacturers Association .

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required by AISI S202, "Code of Standard Practice for Cold-Formed Steel Structural Framing."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, in accordance with ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, in accordance with ASTM E90 and classified in accordance with ASTM E413 by an independent testing agency.

C. Horizontal Deflection: For wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 10 lbf/sq. ft.

D. Design framing systems in accordance with AISI S220, "North American Specification for the Design of Cold-Formed Steel Framing - Nonstructural Members," unless otherwise indicated.

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C645 requirements for metal unless otherwise indicated
2. Protective Coating: Comply with; ASTM A653/A653M, G40;. Galvannealed products are unacceptable.

    a. Coating demonstrates equivalent corrosion resistance with an evaluation report acceptable to authorities having jurisdiction.

B. Studs and Track: ASTM C645 Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks.

1. Manufacturer: CEMCO; California Expanded Metal Products Co.
2. Minimum Base-Steel Thickness: As required by performance requirements for horizontal deflection 0.0329 inch.
3. Depth: As indicated on Drawings.

C. High-Strength Steel Studs and Tracks: Roll-formed with surface deformations to stiffen the framing members.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. CEMCO; California Expanded Metal Products Co.
    b. ClarkDietrich.
    c. SCAFCO Steel Stud Company.

2. Minimum Base-Steel Thickness: As required by horizontal deflection performance requirements.
3. Depth: As indicated on Drawings.

D. Slip-Type Head Joints: Where indicated, provide one of the following:

1. Single Long-Leg Track System: Top track with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
2. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

    a. Manufacturer: CEMCO; California Expanded Metal Products Co.

E. Firestop Tracks: Top track manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Manufacturer: CEMCO, California Expanded Metal Products Co.

F. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Manufacturers: MRI Steel Framing, LLC or equal.
2. Minimum Base-Steel Thickness: 0.0269 inch.

G. Hat-Shaped, Rigid Furring Channels: ASTM C645.

1. Manufacturers: MRI Steel Framing, LLC or equal.
2. Minimum Base-Steel Thickness: 0.0296 inch.
3. Depth: 7/8 inch.

H. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. MRI Steel Framing, LLC.

2. Configuration: Asymmetrical or hat shaped.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

B. Hanger Attachments to Concrete:

1. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 and ACI318 greater than or equal to design load, as determined by testing per ASTM E 448/E 488M conducted by a qualified testing agency.

C. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.

D. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.0538 inch and minimum 1/2-inch- wide flanges.

1. Depth: 2 inches.

E. Furring Channels (Furring Members):

1. Hat-Shaped, Rigid Furring Channels: 7/8 inch deep.

a. Minimum Base-Steel Thickness: 0.0296 inch.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide one of the following:

1. Asphalt-Saturated Organic Felt: ASTM D226/D226M, Type I (No. 15 asphalt felt), nonperforated.
2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C754.
1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.

B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

D. Install bracing at terminations in assemblies.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLATION OF FRAMING SYSTEMS

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

a. Install two studs at each jamb unless otherwise indicated.

b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

E. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLATION OF SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Hangers: 48 inches o.c.
2. Carrying Channels (Main Runners): 48 inches o.c.
3. Furring Channels (Furring Members): 16 inches o.c.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension

system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not attach hangers to steel roof deck.
6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

3.6 FIELD QUALITY CONTROL

A. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

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SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels.

B. Related Requirements:

1. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.
2. Section 093013 "Ceramic Tiling" for tile backer units installed as substrates for ceramic tile.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Gypsum wallboard.
2. Gypsum board, Type X.
3. Gypsum ceiling board.
4. Impact-resistant gypsum board.
5. Mold-resistant gypsum board.
6. Glass-mat, water-resistant backing board.
7. Interior trim.
8. Aluminum trim.
9. Joint treatment materials.
10. Sound-attenuation blankets.
11. Acoustical sealant.

B. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.

C. Samples for Initial Selection: For each type of trim accessory indicated.

D. Samples for Verification: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.

1.4 QUALITY ASSURANCE

A. Mockups: Build mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockups for the following:

a. Each level of gypsum board finish indicated for use in exposed locations.
b. Each texture finish indicated.

2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
3. Simulate finished lighting conditions for review of mockups.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard: ASTM C1396/C1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed; SAINT-GOBAIN.
b. Gold Bond Building Products, LLC provided by National Gypsum Company.
c. USG Corporation.

2. Thickness: 5/8 inch.
3. Long Edges: Tapered.

B. Gypsum Board, Type X: ASTM C1396/C1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed; SAINT-GOBAIN.
b. Gold Bond Building Products, LLC provided by National Gypsum Company.
c. USG Corporation.

2. Thickness: 5/8 inch.
3. Long Edges: Tapered.

C. Gypsum Ceiling Board: ASTM C1396/C1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed; SAINT-GOBAIN.

b. Gold Bond Building Products, LLC provided by National Gypsum Company.
c. USG Corporation.

2. Thickness: 1/2 inch.
3. Long Edges: Tapered.

D. Impact-Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed; SAINT-GOBAIN.
b. Gold Bond Building Products, LLC provided by National Gypsum Company.
c. USG Corporation.

2. Core: 5/8 inch, Type X.
3. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
4. Indentation: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
5. Soft-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
6. Hard-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 3 requirements according to test in Annex A1.
7. Long Edges: Tapered.
8. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

E. Mold-Resistant Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and paper surfaces. Use at exposed to view surfaces inside restrooms and locker rooms.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed; SAINT-GOBAIN.
b. Gold Bond Building Products, LLC provided by National Gypsum Company.
c. USG Corporation.

2. Core: 1/2 inch, for ceiling 5/8 inch, Type X for walls.
3. Long Edges: Tapered.
4. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.4 TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Board: ASTM C1178/C1178M, with manufacturer's standard edges.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed; SAINT-GOBAIN.
b. Gold Bond Building Products, LLC provided by National Gypsum Company.
c. USG Corporation.

2. Core: 5/8 inch, Type X.
3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C1047.

1. Material: Galvanized or aluminum-coated steel sheet.
2. Shapes:

a. Cornerbead.
b. Bullnose bead.
c. LC-Bead: J-shaped; exposed long flange receives joint compound.
d. L-Bead: L-shaped; exposed long flange receives joint compound.
e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
f. Expansion (control) joint.
g. Curved-Edge Cornerbead: With notched or flexible flanges.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Fry Reglet Corporation.
b. Gordon, Inc.
c. Pittcon Industries.

2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B221, Alloy 6063-T5.
3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475/C475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
3. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

D. Joint Compound for Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.

2.7 AUXILIARY MATERIALS

A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.

1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hilti, Inc.
b. Pecora Corporation.
c. United States Gypsum Company.

F. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

A. Comply with ASTM C840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Wallboard Type: As indicated on Drawings.
2. Type X: As indicated on Drawings and where required for fire-resistance-rated assembly.
3. Ceiling Type: Ceiling surfaces.
4. Impact-Resistant and Mold-resistant Type: As indicated on Drawings.
5. Glass-Mat Interior Type: As indicated on Drawings.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with

vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.

4. Fastening Methods: Fasten base layers with screws; fasten face layers with adhesive and supplementary fasteners.

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 INSTALLATION OF TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at showers, tubs, and where indicated to receive tile. Install with 1/4-inch gap where panels abut other construction or penetrations.

B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLATION OF TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Engineer for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. Bullnose Bead: Use where indicated.
3. LC-Bead: Use at exposed panel edges.
4. L-Bead: Use where indicated.
5. U-Bead: Use where indicated.
6. Curved-Edge Cornerbead: Use at curved openings.

D. Aluminum Trim: Install in locations indicated on Drawings.

3.6 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile.
3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

4. Level 5: Where indicated on Drawings.

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

E. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

3.7 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture-damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

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SECTION 093013 - CERAMIC TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Porcelain tile.
2. Porcelain wall tile.
3. Stone thresholds.
4. Tile backing panels.

B. Related Requirements:

1. Section 079200 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
2. Section 092900 "Gypsum Board" for cementitious backer units.

1.3 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."

C. Face Size: Actual tile size, excluding spacer lugs.

D. Module Size: Actual tile size plus joint width indicated.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Initial Selection: For tile, grout, and accessories involving color selection.

D. Samples for Verification:

1. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 36 inches square, but not fewer than four tiles. Use grout of type and in color or colors approved for completed Work.
2. Full-size units of each type of trim and accessory for each color and finish required.
3. Metal edge strips in 6-inch lengths.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

C. Product Certificates: For each type of product.

D. Product Test Reports: For tile-setting and -grouting products and certified porcelain tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.8 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer employs only Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers for Project.

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of each type of floor tile installation.
2. Build mockup of each type of wall tile installation.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.

1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:

1. Stone thresholds.
2. Metal edge strips.

2.2 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements unless otherwise indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

2.3 TILE PRODUCTS

A. Porcelain Tile Type: Unglazed porcelain tile.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Marazzi Tile, Inc.
b. Daltile.
c. Interceramic.

2. Certification: Tile certified by the Porcelain Tile Certification Agency.
3. Face Size: As indicated on the architectural finish schedule.
4. Face Size Variation: Rectified.
5. Thickness: 1/4 inch.
6. Face: Plain with square edges.
7. Dynamic Coefficient of Friction: Not less than 0.42.
8. Tile Color, Glaze, and Pattern: As indicated on the architectural finish schedule.
9. Grout Color: As selected by Engineer from manufacturer's full range.
10. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

a. External Corners: Surface bullnose, module size same as adjoining flat tile.
b. Internal Corners: Field-butted square corners.

B. Bullnose Tile/Build-up Base.

1. Tile Color, Glaze, and Pattern: As indicated on the architectural finish schedule drawing.

2.4 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.

B. Marble Thresholds: ASTM C503/C503M, with a minimum abrasion resistance of 12 according to ASTM C1353 or ASTM C241/C241M and with honed finish.

2.5 SETTING MATERIALS

A. Standard Dry-Set Mortar (Thinset): ANSI A118.1.

1. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.1.

B. Modified Dry-Set Mortar (Thinset): ANSI A118.4.

1. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

2.6 GROUT MATERIALS

A. High-Performance Tile Grout: ANSI A118.7.

1. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.
2. Polymer Type: Acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.

2.7 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Vapor-Retarder Membrane: Polyethylene sheeting, ASTM D4397, 4.0 mils thick.

C. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless steel, ASTM A276/A276M or ASTM A666, 300 Series exposed-edge material.

D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

E. Floor Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

2.8 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

    a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
    b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Engineer.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from

other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION OF CERAMIC TILE

A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:

    a. Tile floors in wet areas.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.

F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Ceramic Mosaic Tile: 1/16 inch.
2. Porcelain Tile: 1/4 inch.

H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

I. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

J. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.

K. Floor Sealer: Apply floor sealer to grout joints according to floor-sealer manufacturer's written instructions. As soon as floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 ADJUSTING AND CLEANING

A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.5 PROTECTION

A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.6 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:

1. Ceramic Tile Installation: TCNA F111 and ANSI A108.1A; cement mortar bed (thickset) with cleavage membrane.

a. Ceramic Tile Type: Porcelain Tile.
b. Bond Coat for Cured-Bed Method: Medium-bed, modified dry-set mortar.
c. Grout: High-performance unsanded grout.

END OF SECTION 093013

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SECTION 095123 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section

1.2 SUMMARY

A. Section Includes:

1. Acoustical tiles.
2. Metal suspension system.

B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data:

1. Acoustical tiles.
2. Metal suspension system.
3. Accessories.

B. Samples: For each exposed product and for each color and texture specified, 6 inches in size.

C. Samples for Initial Selection: For components with factory-applied finishes.

D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:

1. Acoustical Tiles: Set of full-size Samples of each type, color, pattern, and texture.
2. Concealed Suspension-System Members: 6-inch- long Sample of each type.
3. Exposed Moldings and Trim: Set of 6-inch- long Samples of each type and color.
4. Seismic Clips: Full size.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Ceiling suspension-system members.
2. Structural members to which suspension systems will be attached.
3. Method of attaching hangers to building structure.

    a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.

4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
5. Size and location of initial access modules for acoustical tile.
6. Items penetrating finished ceiling and ceiling-mounted items including the following:

    a. Lighting fixtures.
    b. Diffusers.
    c. Grilles.
    d. Speakers.
    e. Sprinklers.
    f. Access panels.
    g. Perimeter moldings.

7. Show operation of hinged and sliding components adjacent to acoustical tiles.
8. Minimum Drawing Scale: 1/4 inch = 1 foot.

B. Qualification Data: For testing agency.

C. Product Test Reports: For each acoustical tile ceiling, for tests performed by a qualified testing agency.

D. Evaluation Reports: For each acoustical tile ceiling suspension system and anchor and fastener type, from ICC-ES.

E. Field quality-control reports.

F. Provide documentation verifying that acoustical ceiling meets the pollutant emission limits in accordance with the California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.2 (January 2017), as required by CALGreen.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size tiles equal to 2 percent of quantity installed.
2. Suspension-System Components: Quantity of each concealed grid and exposed component equal to 2 percent of quantity installed.

1.8 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockup of typical ceiling area as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Engineer specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical tiles, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical tile ceiling installation.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Source Limitations for Suspended Acoustical Tile Ceiling System: Obtain each type of acoustical ceiling tile and its suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Suspended ceilings to withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.

B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Class A in accordance with ASTM E1264.
2. Smoke-Developed Index: 50 or less.

C. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL or from the listings of another qualified testing agency.

2.3 ACOUSTICAL TILES (ACT)

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Armstrong World Industries, Inc.
2. CertainTeed Corporation.
3. USG Corporation.

B. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E1264 classifications as designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

C. Classification: Provide tiles as follows:

1. Basis of Design: “Calla” as manufactured by Armstrong or approved equivalent by specified manufacturer.

D. Color: White.

E. Light Reflectance (LR): Not less than0.80 .

F. Ceiling Attenuation Class (CAC): Not less than 30.

G. Noise Reduction Coefficient (NRC): Not less than 0.70.

H. Edge/Joint Detail: As indicated by manufacturer's designation.

I. Thickness: 3/4 inch.

J. Modular Size: As indicated on Drawings.

K. Grid: Factory 9/16” wide steel grid with factory white finish.

L. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested in accordance with ASTM D3273, ASTM D3274, or ASTM G21 and evaluated in accordance with ASTM D3274 or ASTM G21.

2.4 METAL SUSPENSION SYSTEM

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Armstrong World Industries, Inc.
2. USG Corporation.

B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, fully concealed, metal suspension system and accessories of type, structural classification, and finish indicated that complies with applicable requirements in ASTM C635/C635M.

1. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" in accordance with ASTM C635/C635M.

2.5 ACCESSORIES

A. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing in accordance with ASTM E488/E488M or ASTM E1512 as applicable, conducted by a qualified testing and inspecting agency.

a. Type: Post-installed expansion anchors.
b. Corrosion Protection, Carbon Steel: Components zinc plated in accordance with ASTM B633, Class SC 1 (mild) service condition.
c. Corrosion Protection, Stainless Steel: Components complying with ASTM F593 and ASTM F594, Group 1 Alloy 304 or 316.

2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing in accordance with ASTM E1190, conducted by a qualified testing and inspecting agency.

B. Wire Hangers, Braces, and Ties: Provide wires as follows:

1. Stainless Steel Wire: ASTM A580/A580M, Type 304, nonmagnetic.

2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch- diameter wire.

C. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

D. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical tiles in-place during a seismic event.

2.6 METAL EDGE MOLDINGS AND TRIM

A. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements.

1. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils. Comply with ASTM C635/C635M and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders unless otherwise indicated and comply with layout shown on reflected ceiling plans.

B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

A. Install suspended acoustical tile ceilings in accordance with ASTM C636/C636M, seismic design requirements, and manufacturer's written instructions.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post-installed mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
8. Do not attach hangers to steel deck tabs.
9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or post-installed anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical tiles.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Arrange directionally patterned acoustical tiles as follows:

1. As indicated on reflected ceiling plans.

G. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension-system flanges into kerfed edges of tiles so tile-to-tile joints are interlocked.

1. Fit adjoining tiles to form flush, tight joints. Scribe and cut tiles for accurate fit at borders and around penetrations through ceiling.
2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tiles and moldings, spaced 12 inches o.c.

3.4 ERECTION TOLERANCES

A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet, non-cumulative.

B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet, non-cumulative.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Periodic inspection during the installation of suspended ceiling grids in accordance with ASCE/SEI 7.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Perform the following tests and inspections of completed installations of acoustical tile ceiling hangers and anchors and fasteners in successive stages and when installation of ceiling suspension systems on each floor has reached 20 percent completion, but no tiles have been installed. Do not proceed with installations of acoustical tile ceiling hangers for the next area until test results for previously completed installations of acoustical tile ceiling hangers show compliance with requirements.

1. Within each test area, testing agency will select one of every 10 power-actuated fasteners and post-installed anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every two post-installed anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.
2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

D. Acoustical tile ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.6 ADJUSTING

A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

B. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095123

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SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Thermoplastic-rubber base.
2. Rubber molding accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Initial Selection: For each type of product indicated.

C. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.6 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOPLASTIC-RUBBER BASE

A. Product Standard: ASTM F1861, Type TP (rubber, thermoplastic).

1. Group: I (solid, homogeneous).
2. Style and Location:

a. Style B, Cove: Provide in areas with resilient floor coverings.
b. Style C, Butt to: Provide in areas indicated.

B. Thickness: 0.125 inch.

C. Height: As indicated on Drawings.

D. Lengths: Cut lengths 48 inches long or coils in manufacturer's standard length.

E. Outside Corners: Preformed.

F. Inside Corners: Preformed.

G. Colors: As indicated by manufacturer's designations.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:

1. Remove adhesive and other blemishes from surfaces.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

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SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Luxury Vinyl floor tile.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of resilient floor tile.

1. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
2. Show details of special patterns.

C. Samples: Full-size units of each color, texture, and pattern of floor tile required.

D. Product Schedule: For floor tile. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMTTALS

A. Provide documentation verifying that resinous flooring materials meet the pollutant emission limits in accordance with the California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.2 or later, as required by CALGreen.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Coordinate mockups in this Section with mockups specified in other Sections.

a. Size: Minimum 100 sq. ft. for each type, color, and pattern in locations directed by Engineer.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Engineer specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.8 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 LUXURY VINYL FLOOR TILE

A. Basis-of-Design: Shaw Contract.

1. Style: Grain.
2. Style Name: 0364V.
3. Color Name: Antler.
4. Color Number: 6461.
5. Size: 7 inches x 48 inches.
6. Construction: 20 mil thick, floating LVT.
7. Installation: Staggered joints.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

    a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lbs. of water/1000 sq. ft. in 24 hours.

b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

B. Perform the following operations immediately after completing floor tile installation:

1. Remove adhesive and other blemishes from surfaces.

2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover floor tile until Substantial Completion.

END OF SECTION 096519

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SECTION 096723 - RESINOUS FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Resinous flooring systems.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required.

B. Samples for Initial Selection: For each type of exposed finish required.

C. Samples for Verification: For each resinous flooring system required, 6 inches square, applied to a rigid backing by Installer for this Project.

1.5 INFORMATIONAL SUBMITTALS

A. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

B. Material Certificates: For each resinous flooring component, from manufacturer.

C. Material Test Reports: For each resinous flooring system, by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For resinous flooring to include in maintenance manuals.

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1.7 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

B. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.

C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Apply full-thickness mockups on 96-inch square floor area selected by Engineer.

    a. Include 96-inch length of integral cove base with inside and outside corner.

2. Simulate finished lighting conditions for Engineer's review of mockups.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Engineer specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.

B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.

C. Close spaces to traffic during resinous flooring application and for 24 hours after application unless manufacturer recommends a longer period.

PART 2 - PRODUCTS

2.1 PERORMANCE REQUIREMENTS

A. Flammability: Self-extinguishing according to ASTM D635.

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2.2 MANUFACTURERS

A. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source from single manufacturer. Obtain secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from manufacturer recommended in writing by manufacturer of primary materials.

2.3 RESINOUS FLOORING

A. Resinous Flooring System: Abrasion-, impact-, and chemical-resistant, aggregate-filled, and resin-based monolithic floor surfacing designed to produce a seamless floor and integral cove base.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Sherwin-Williams Company, General Polymers.
    b. Stonhard, Inc.
    c. Tnemec Inc.

B. System Characteristics:

1. Color and Pattern: As indicated on Drawings.
2. Wearing Surface: Textured for slip resistance.
3. Overall System Thickness: 1/4 inch.

C. Primer: Type recommended by resinous flooring manufacturer for substrate and resinous flooring system indicated.

1. Formulation Description: 100 percent solids.

D. Waterproofing Membrane: Type recommended by resinous flooring manufacturer for substrate and resinous flooring system indicated.

1. Formulation Description: 100 percent solids.

E. Reinforcing Membrane: Flexible resin formulation that is recommended by resinous flooring manufacturer for substrate and resinous flooring system indicated and that inhibits substrate cracks from reflecting through resinous flooring.

1. Formulation Description: 100 percent solids.

    a. Provide fiberglass scrim embedded in reinforcing membrane.

F. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.

G. Body Coats:

1. Resin: Epoxy.

2. Formulation Description: 100 percent solids.
3. Type: Pigmented.
4. Application Method: Self-leveling slurry with broadcast aggregates.
5. Number of Coats: One.
6. Thickness of Coats: 1/4 inch.
7. Aggregates: Manufacturer's standard.

H. Grout Coat:

1. Resin: Epoxy.
2. Formulation Description: 100 percent solids.
3. Type: Pigmented.
4. Thickness of Coat: 8 mils .

I. Topcoats: Sealing or finish coats.

1. Resin: Epoxy.
2. Formulation Description: 100 percent solids.
3. Type: Pigmented.
4. Number of Coats: One.
5. Thickness of Coats: 1/4 inch.
6. Finish: Matte.

J. System Physical Properties: Provide resinous flooring system meet industry-standard requirements for compressive strength, impact resistance, abrasion resistance, and chemical resistance, as tested per applicable ASTM standards.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry substrate for resinous flooring application.

B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.

1. Roughen concrete substrates as follows:

a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
b. Comply with NACE No. 6/SSPC-SP13, with a Concrete Surface Profile (CSP) of 3 or greater in accordance with the International Concrete Repair Institute (ICRI) Technical Guideline No. 310.2R, unless manufacturer's written instructions are more stringent.

2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written instructions.
3. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.

    a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with application of resinous flooring only after substrates have maximum moisture-vapor-emission rate of 3 lb. of water/1,000 sq. ft. of slab area in 24 hours.
    b. Relative Humidity Test: Use in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

4. Alkalinity and Adhesion Testing: Verify that concrete substrates have pH within acceptable range. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.

C. Patching and Filling: Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.

1. Control Joint Treatment: Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written instructions.

D. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.

3.2 INSTALLATION

A. Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.

1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
3. Expansion and Isolation Joint Treatment: At substrate expansion and isolation joints, comply with resinous flooring manufacturer's written instructions.

B. Primer: Apply primer over prepared substrate at manufacturer's recommended spreading rate.

C. Waterproofing Membrane: Apply waterproofing membrane where indicated on Drawings, in manufacturer's recommended thickness.

1. Apply waterproofing membrane to integral cove base substrates.

D. Reinforcing Membrane: Apply reinforcing membrane to substrate cracks.

E. Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details, including those for taping, mixing, priming, troweling, sanding, and topcoating of cove base. Round internal and external corners.

1. Integral Cove Base: 4 inches high.

F. Self-Leveling Body Coats: Apply self-leveling slurry body coats in thickness indicated for flooring system.

1. Aggregates: Broadcast aggregates at rate recommended by manufacturer and, after resin is cured, remove excess aggregates to provide surface texture indicated.

G. Troweled or Screeded Body Coats: Apply troweled or screeded body coats in thickness indicated for flooring system. Hand or power trowel and grout to fill voids. When body coats are cured, remove trowel marks and roughness using method recommended by manufacturer.

H. Grout Coat: Apply grout coat, of type recommended by resinous flooring manufacturer, to fill voids in surface of final body coat.

I. Topcoats: Apply topcoats in number indicated for flooring system and at spreading rates recommended in writing by manufacturer and to produce wearing surface indicated.

3.3 FIELD QUALITY CONTROL

A. Material Sampling: Owner may, at any time and any number of times during resinous flooring application, require material samples for testing for compliance with requirements.

1. Owner will engage an independent testing agency to take samples of materials being used. Material samples will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will test samples for compliance with requirements, using applicable referenced testing procedures or, if not referenced, using testing procedures listed in manufacturer's product data.
3. If test results show applied materials do not comply with specified requirements, pay for testing, remove noncomplying materials, prepare surfaces coated with unacceptable materials, and reapply flooring materials to comply with requirements.

B. Core Sampling: At the direction of Owner and at locations designated by Owner, take one core sample per 1,000 sq. ft. of resinous flooring, or portion of, to verify thickness. For each sample that fails to comply with requirements, take two additional samples. Repair damage caused by coring. Correct deficiencies in installed flooring as indicated by testing.

3.4 PROTECTION

A. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

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SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Primers.
2. Finish coatings.
3. Floor sealers and paints.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for shop priming metal fabrications.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include preparation requirements and application instructions.
2. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product.

C. Product Schedule: Use same designations indicated on Drawings and in the Exterior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

1.4 INFORMATIONAL SUBMITTALS

A. Provide documentation demonstrating that all coatings comply with applicable local or regional air pollution control or air quality management district VOC regulations and CALGreen VOC limits.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint Products: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Benjamin Moore & Company (BMC).
2. PPG Paints (PPG).
3. The Sherwin-Williams Company (SWC).

B. Source Limitations: Obtain each paint product from single source from single manufacturer.

2.2 PAINT PRODUCTS, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by topcoat manufacturer for use in paint system and on substrate indicated.

B. Colors: As selected by Architect from manufacturer's full range.

2.3 PRIMERS

A. Exterior, Latex Block Filler: Water-based, pigmented, high-solids, emulsion coating formulated to bridge and fill porous surfaces of exterior concrete masonry units in preparation for specified subsequent coatings.

1. Minimum Solids Content: Manufacturer's standard percentage solids by volume.

B. Solvent-Based Bonding Primer: Pigmented, solvent-based primer formulated for exterior use and to seal substrates and promote adhesion of specified subsequent coatings.

C. Epoxy Metal Primer: Corrosion-resistant, solvent-based, two-component epoxy primer formulated for use on prepared, exterior ferrous- and galvanized-metal surfaces.

2.4 FINISH COATINGS

A. Exterior Latex Paint, Gloss: Water-based, pigmented, acrylic-copolymer-emulsion coating formulated for alkali, mold, microbial, scrub, blocking (sticking of two painted surfaces), and water resistance and for use on exterior, primed, wood and metal trim, sashes, frames, and doors.

1. Gloss Level: Manufacturer's standard gloss finish.

B. Exterior, High-Build Latex Paint: Water-based, high-build, pigmented, emulsion coating; high-solids content improves filling, uniformity, and film build on concrete masonry surfaces. Formulated for abrasion, mold, microbial, and wind-driven rain resistance and for use on exterior masonry, concrete masonry unit, and concrete surfaces.

1. Gloss and Sheen Level: Manufacturer's standard low-gloss finish.
2. Minimum Solids Content: Manufacturer's standard percentage solids by volume.

C. High-Build Epoxy Paint, Low Gloss: High-solids, two-component epoxy; formulated for use on exterior concrete, masonry, and primed-metal surfaces.

1. Gloss and Sheen Level: Manufacturer's standard low-gloss finish.

2.5 FLOOR SEALERS AND PAINTS

A. Solvent-Based, Concrete-Floor Sealer: Clear, acrylic, solvent-based sealer formulated for oil, gasoline, alkali, and water resistance and for use on exterior, concrete traffic surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and Concrete Masonry Units): 12 percent.
3. Gypsum Board: 12 percent.

C. Portland Cement Plaster Substrates: Verify that plaster is fully cured.

D. Exterior Gypsum Board Substrates: Verify that finishing compound is dry and sanded smooth.

E. Verify suitability of substrates, including surface conditions and compatibility, with finishes and primers.

F. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems specified in this Section.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

H. Aluminum Substrates: Remove loose surface oxidation.

I. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 INSTALLATION

A. Apply paints in accordance with manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
4. Paint entire exposed surface of window frames and sashes.
5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
6. Primers specified in the Exterior Painting Schedule may be omitted on items that are factory primed or factory finished if compatible with intermediate and topcoat coatings and acceptable to intermediate and topcoat paint manufacturers.

B. Tint undercoats same color as topcoat but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed to view:

a. Uninsulated metal piping.
b. Uninsulated plastic piping.
c. Pipe hangers and supports.
d. Metal conduit.
e. Plastic conduit.
f. Tanks that do not have factory-applied final finishes.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written instructions, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written instructions.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
3. Allow empty paint cans to dry before disposal.
4. Collect waste paint by type and deliver to recycling or collection facility.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. High-Build Latex System: Dry film thickness of not less than 10 mils.

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Exterior, high-build latex paint.

B. Concrete Substrates, Traffic Surfaces:

1. Clear, Solvent-Based Sealer System:

a. Prime Coat: Matching topcoat.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Solvent-based, concrete-floor sealer.

C. Steel and Iron Substrates:

1. Alkyd System:

a. Prime Coat: Surface-tolerant metal primer.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Exterior alkyd enamel, semigloss.

D. Aluminum Substrates:

1. Alkyd System:

a. Pretreatment Coat: Vinyl wash primer.
b. Prime Coat: Quick-drying aluminum primer.
c. Intermediate Coat: Matching topcoat.
d. Topcoat: Exterior alkyd enamel, semigloss.

E. Copper Substrates:

1. Alkyd System:

a. Pretreatment Coat: Vinyl wash primer.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Exterior alkyd enamel, semigloss.

F. Exterior Gypsum Board Substrates:

1. High-Build Latex System: Dry film thickness of not less than 10 mils.

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Exterior, high-build latex paint.

END OF SECTION 099113

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SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Primers.
2. Water-based finish coatings.
3. Solvent-based finish coatings.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for shop priming metal fabrications.

C. Surfaces not included as part of field-applied finish work, unless otherwise indicated:

1. Pre-finished Items: Do not include painting when factory-finishing or installer-finishing is specified for such items, such as but not limited to architectural woodwork and casework, metal roof edging systems, pre-finished partition systems, acoustic materials, toilet enclosures, elevator entrance doors, frames, and equipment, and mechanical and electrical equipment, including, fixtures, switchgear, distribution cabinets, and light fixtures.
2. Concealed Surfaces: Finishing of walls and ceilings in concealed and generally inaccessible areas, foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts.
3. Finished Metal Surfaces: Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze, and similar finished materials.
4. Operating Parts: Moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sensing devices, motors, and fan shafts.
5. Code-required Labels: Do not paint over Underwriters' Laboratories, Warnock-Hershey or Factory Mutual labels, or any equipment identification, performance rating, name, or nomenclature plates.

1.3 DEFINITIONS

A. MPI Gloss Levels: Following define gloss levels according to ASTM D 523:

1. MPI Gloss Level 5 - Traditional Semi-Gloss Finish: 35 to 70 units at 60 degrees.

B. Paint: Various coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials, whether used as prime, intermediate or finish coats.

C. Finished Areas: Interior rooms, areas, and spaces in which exposed surfaces are finished by Work of this Section or other Sections. Non-exposed spaces above suspended ceilings are not to be included as part of painting Work, unless otherwise indicated.

D. Utility Areas: Exterior and interior rooms, areas, and spaces dedicated for plumbing, mechanical, electrical, communication, and safety equipment.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Indicate.
2. VOC content.

B. Samples: For each type of topcoat product.

C. Samples for Initial Selection: For each type of topcoat product.

D. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

E. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 INFORMATIONAL SUBMITTALS

A. Provide documentation demonstrating that all coatings comply with applicable local or regional air pollution control or air quality management district VOC regulations and CALGreen VOC limits.

1.6 CLOSEOUT SUBMITTALS

A. Coating Maintenance Manual: Upon conclusion of painting, Contractor, paint manufacturer, or supplier shall submit a coating maintenance manual, such as Sherwin-Williams “Custodian Project Color and Product Information” report or equal that includes:

1. Area Summary with finish schedule.
2. Area Detail designating where each product, color, and finish was used.
3. Product data pages and safety data sheets.
4. Care and cleaning instructions.

5. Touch-up procedures.
6. Color samples, 4 inches by 5 inches of each color and finish.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.8 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Engineer will select one surface to represent surfaces and conditions for application of each paint system.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
b. Other Items: Engineer will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Engineer at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Engineer specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 degrees F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.10 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 degrees and 95 degrees F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.

C. Lead Paint: It is not expected that lead paint will be encountered in the Work.

1. If suspected lead paint is encountered, do not disturb; immediately notify Engineer and Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Benjamin Moore & Company (BMC).
2. PPG Paints (PPG).
3. The Sherwin-Williams Company (SWC).

B. Source Limitations: Obtain paint materials from single source from single listed manufacturer.

1. Manufacturer's designations listed on a separate color schedule are for color reference only and do not indicate prior approval.

2.2 PAINT PRODUCTS, GENERAL

A. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

B. Colors: As selected by Engineer from manufacturer's full range.

2.3 MIXING

A. Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogenous coating with good flow and brushing properties, and capable of drying or curing free of streaks or sags.

B. Mix and prepare painting materials in accordance with manufacturer's directions.

C. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.

D. Stir materials before application to produce a mixture of uniform density and stir during application. Do not stir surface film into material. Remove film and strain material before using.

E. Do not thin painting materials unless recommended by manufacturer. When paint thinning is required, comply with manufacturer's printed instructions; use only thinners approved by paint manufacturer.

2.4 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify suitability of substrates, including surface conditions.
2. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.
3. Report, in writing, conditions that may affect application, appearance, or performance of paint.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (CMUs): 12 percent.
3. Gypsum Board: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

1. Application of coating indicates acceptance of surfaces and conditions.
2. Repainting of Previously Painted Surfaces: Verify conditions and compatibility between new and existing painting products.

E. Proceed with coating application only after unsatisfactory conditions have been corrected. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with paint manufacturer's written preparation instructions and recommendations applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, rust, scale, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
2. Remove mildew, efflorescence, deleterious films, and foreign material from surface by appropriate methods as recommended by manufacturer.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

1. Concrete Floors: Remove oil, dust, grease, dirt, and other foreign materials. Comply with SSPC-SP-13/NACE 6 or ICRI 03732.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

1. SSPC-SP 16, "Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals."

I. Aluminum Substrates: Remove loose surface oxidation.

J. All Substrates: Remove foreign materials, dust, dirt, and other deleterious films that impairs bond of paints to substrates.

K. Previously Finished Surfaces: Comply with paint manufacturer's specifications appropriate for substrate to be coated, for proper preparation of previously finished surfaces.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
6. Comply with manufacturer's recommendations for drying time required between succeeding coats.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify Engineer in writing of anticipated problems in using specified coating systems with substrates primed by others.

F. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:

a. Uninsulated metal piping.
b. Uninsulated plastic piping.

c. Pipe hangers and supports.
d. Metal conduit.
e. Plastic conduit.
f. Tanks that do not have factory-applied final finishes.
g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

2. Paint the following work where exposed in occupied spaces:

a. Equipment, including panelboards.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
h. Other items as directed by Engineer.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

G. Film Thickness: Apply paint in wet film thickness (WFT) recommended by paint manufacturer to achieve specified dry film thickness (DFT) for each coat of paint. Since DFT varies among manufacturers, this reference is not included in Article “Interior Painting Schedule.”

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
3. Allow empty paint cans to dry before disposal.
4. Collect waste paint by type and deliver to recycling or collection facility.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Engineer, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Paragraphs below identify specific painting materials and appropriate specified painting system to be used on a particular substrate; actual substrate material surfaces for this Project shall be as indicated in this Interior Painting Schedule and as indicated on Drawings.

B. Concrete Substrates, Nontraffic Surfaces.

1. Latex System - Walls and Ceilings:

a. Prime Coat: Alkali resistant acrylic latex:

1) SWC: Loxon Concrete & Masonry Primer/Sealer, LX02-50 Series.
2) PPG: Perma-Crete Interior/Exterior Alkali Resistant Primer 4-603XI.
3) BMC: Ultra Spec 500 Interior Latex Primer N534.

b. Intermediate Coat: Latex, matching topcoat.

c. Topcoat: Acrylic latex enamel, semi-gloss finish (MPI Gloss Level 5):

1) SWC: ProMar 200 Zero VOC Latex Semi-Gloss, B31-12650 Series.
2) PPG: Speedhide Zero Interior Zero VOC Latex Semi-Gloss 6-4510XI.
3) BMC: Ultra Spec 500 Interior Semi-Gloss Finish N539.

C. CMU Substrates.

1. Light Industrial Water Based System - Walls:

a. Block Filler: Acrylic latex, interior/exterior:

1) SWC: Heavy Duty Block Filler - B42W46.
2) PPG: Speedhide Int/Ext Hi Fill Acrylic Latex Block Filler 6-15XI.
3) BMC: Corotech Acrylic Block Filler V114.

b. Primer: Alkali resistant, latex, flat.

1) SWC: Loxon Concrete & Masonry Primer, LX-50 Series.
2) PPG: Perma-Crete Int/Ext Alkali Resistant Primer, 4-603XI.
3) BMC: Acrylic High-Build Masonry Primer, 609/K609.

c. Intermediate Coat: Latex, matching topcoat.

d. Topcoat: Acrylic latex enamel, semi-gloss finish (MPI Gloss Level 5):

1) SWC: Pro Industrial Pre-Catalyzed Waterbased Epoxy Semi-Gloss, K46-1150 Series.
2) PPG: Pitt-Glaze WB1 Interior Semi-Gloss Pre-Catalyzed Water-Borne Acrylic Epoxy 16-510 Series.
3) BMC: Corotech Pre-Catalyzed Waterborne Epoxy Semi- Gloss V341.

D. Steel Substrates.

1. Light Industrial Water Based Alkyd System:

a. Prime Coat: Primer, rust-inhibitive, water-based:

1) SWC: Pro Industrial Pro-Cryl Universal Primer, B66-310 Series.
2) PPG: Pitt-Tech Int/Ext WB Acrylic Primer DTM Industrial Enamel 90-712.
3) BMC: Acrylic Metal Primer HP04.

b. Prime Coat: Primer, epoxy, anti-corrosive, for metal:

1) SWC: Kem Bond HS Metal Primer, B50WZ series.
2) PPG: Multiprime 4360 Int/Ext Alkyd Industrial Primer.
3) BMC: Corotech Epoxy Mastic V160.

c. Prime Coat: Shop primer specified in Section where substrate is specified.
d. Intermediate Coat: Matching topcoat.
e. Topcoat: Waterbased alkyd, interior, light industrial, semi-gloss finish (MPI Gloss Level 5):

1) SWC: Pro Industrial Waterbased Alkyd Urethane Semi-Gloss, B53-1150 series.
2) PPG: Pitt-Tech Plus Int/Ext Semi-Gloss DTM Industrial Enamel 90-1210 Series.
3) BMC: Ultra Spec DTM Semi-Gloss HP29.

E. Galvanized-Metal Substrates:

1. Modified Alkyd System: Light Industrial Water Based Alkyd System.

a. Prime Coat: Primer, galvanized, water-based:

1) SWC: Pro Industrial Pro-Cryl Universal Primer, B66-310 Series.
2) PPG: Pitt-Tech Plus 4020 WB Acrylic DTM Industrial Primer.
3) BMC: Latex Metal Primer HP04.

b. Intermediate Coat: Matching topcoat.

c. Topcoat: Water-based alkyd, interior, semi-gloss finish (MPI Gloss Level 5).

1) SWC: Pro Industrial Waterbased Alkyd Urethane Semi-Gloss, B53-1150.
2) PPG: Speedhide Interior/Exterior WB Alkyd Semi-Gloss Enamel 6-1510XI Series.

3) BMC: Advance Semi-Gloss Waterborne Alkyd 793.

F. Aluminum (Not Anodized or Otherwise Coated) Substrates:

1. Light Industrial Water Based Alkyd System:

a. Prime Coat: Primer, water-based for aluminum:

1) SWC: Pro Industrial Pro-Cryl Universal Primer, B66-310 Series.
2) PPG: Pitt-Tech Plus 4020 WB Acrylic DTM Industrial Primer.
3) BMC: Acrylic Latex Metal Primer HP04.

b. Intermediate Coat: Matching topcoat.

c. Topcoat: Water-based alkyd, interior, gloss finish (MPI Gloss Level 5):

1) SWC: Pro Industrial Waterbased Alkyd Urethane Gloss, B53-1050 series.
2) PPG: Speedhide Interior/Exterior WB Alkyd Gloss Enamel 6-1610XI Series.
3) BMC: Advance High Gloss Waterborne Alkyd N794.

G. Gypsum Board Substrates:

1. Latex over Latex Sealer System:

a. Prime Coat: Primer sealer, latex, interior.

1) SWC: ProMar 200 Zero VOC Latex Primer, B28-2600.
2) PPG: Speedhide Zero Interior ZERO VOC Latex Sealer 6-4900XI.
3) BMC: Ultra Spec 500 Interior Primer N534.

b. Intermediate Coat: Matching topcoat.

c. Topcoat: Latex, interior, semi-gloss finish (MPI Gloss Level 5):

1) SWC: ProMar 200 Zero VOC Interior Latex Semi-Gloss, B31-12650 Series.
2) PPG: Speedhide Zero Interior Zero VOC Latex Semi-Gloss 6-4510XI Series.
3) BMC: Ultra Spec 500 Interior Semi-Gloss Finish N539.

END OF SECTION 099123

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Division 10

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SECTION 101423.16 - ROOM-IDENTIFICATION PANEL SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes room-identification signs that are directly attached to the building.

B. Related Requirements:

1. Section 101413 “Panel Signage” for restrictive, warning, and hazardous materials identification signs.

1.3 DEFINITIONS

A. Accessible: In accordance with the accessibility standard.

1.4 COORDINATION

A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.

B. Furnish templates for placement of electrical service embedded in permanent construction by other installers.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For room-identification signs.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.

C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.

1. Include representative Samples of available typestyles and graphic symbols.

D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:

1. Room-Identification Signs: Full-size Sample.
2. Variable Component Materials: 8-inch Sample of each base material, character (letter, number, and graphic element) in each exposed color and finish not included in Samples above.
3. Exposed Accessories: Full-size Sample of each accessory type.

E. Product Schedule: For room-identification signs. Use same designations indicated on Drawings or specified.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and Installer.

B. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Variable Component Materials: 12 replaceable text inserts and interchangeable characters (letters, numbers, and graphic elements) of each type.
2. Tools: One set(s) of specialty tools for assembling signs and replacing variable sign components.

1.9 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.10 FIELD CONDITIONS

A. Field Measurements: Verify locations of anchorage devices and electrical service embedded in permanent construction by other installers by field measurements before fabrication and indicate measurements on Shop Drawings.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of finishes beyond normal weathering.
b. Deterioration of embedded graphic image.
c. Separation or delamination of sheet materials and components.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design".

2.2 ROOM-IDENTIFICATION SIGNS

A. Room-Identification Sign: Sign system with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ACE Sign Systems, Inc.
b. ASI Sign Systems, Inc.
c. Seton Identification Products; a Brady Corporation company.

2. Laminated-Sheet Sign: Photopolymer face sheet with raised graphics laminated over subsurface graphics to acrylic backing sheet to produce composite sheet.

a. Composite-Sheet Thickness: Manufacturer's standard for size of sign.
b. Surface-Applied Graphics: Applied photo image.
c. Color(s): Match Engineer's sample.

3. Sign-Panel Perimeter: Finish edges smooth.

a. Edge Condition at Vertical Edges at Horizontal Edges: Square cut.
b. Corner Condition in Elevation: Square.

4. Frame: Entire perimeter.

a. Material: Aluminum.
b. Corner Condition in Elevation: Mitered.

c. Finish and Color: As selected by Engineer from manufacturer's full range.

5. Mounting: Manufacturer's standard method for substrates indicated with concealed anchors or magnetic tape.
6. Text and Typeface: Finish raised characters to contrast with background color, and finish Braille to match background color.

2.3 SIGN MATERIALS

A. Aluminum Sheet and Plate: ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

B. Aluminum Extrusions: ASTM B221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

C. Acrylic Sheet: ASTM D4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).

D. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.4 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.
2. For exterior exposure, furnish stainless-steel devices unless otherwise indicated.
3. Exposed Metal-Fastener Components, General:

a. Fabricated from same basic metal and finish of fastened sign unless otherwise indicated.
b. Fastener Heads: Use flathead or oval countersunk screws and bolts with tamper-resistant Allen-head slots unless otherwise indicated.

4. Sign Mounting Fasteners:

a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly unless otherwise indicated.
b. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, and installed in predrilled holes.

B. Adhesive: As recommended by sign manufacturer.

C. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch thick, with adhesive on both sides.

2.5 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
4. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

B. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Ensure image is free of rough edges.

C. Subsurface-Etched Graphics: Reverse etch back face of clear face-sheet material. Fill resulting copy with manufacturer's standard enamel. Apply opaque manufacturer's standard background color coating over enamel-filled copy.

2.6 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

A. Color Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

B. Accessibility: Install signs in locations on walls according to the accessibility standard.

C. Mounting Methods:

1. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.

3.2 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 101423.16

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SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Under lavatory guards.

B. Related Requirements:

1. Section 093013 "Ceramic Tiling" for ceramic toilet and bath accessories.

1.3 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Include electrical characteristics.

B. Samples: For each exposed product and for each finish specified, full size.

1. Approved full-size Samples will be returned and may be used in the Work.

C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify accessories using designations indicated.

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranties.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Structural Performance: Design accessories and fasteners to comply with the following requirements:

1. Grab Bars: Installed units are able to resist 250 lbf concentrated load applied in any direction and at any point.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by Bradley Corporation, comparable product by the following or equal:

1. Bobrick.
2. Bradley

B. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer.

C. Toilet Tissue (Roll) Dispenser:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Bradley Washroom Equipment, Inc.

2. Description: Combination Unit: Bradley Model #5912.
3. Mounting: Surface mounted.
4. Operation: Eccentric-shaped, molded-plastic spindle revolves one-half revolution per dispensing operation for controlled delivery; core cannot be removed until roll is empty.
5. Capacity: Designed for 4-1/2- or 5-inch- diameter tissue rolls.
6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

D. Combination Towel (Folded) Dispenser/Waste Receptacle:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. Bradley Corporation.

2. Bradley Model #2291.

3. Description: Combination unit for dispensing C-fold or multifold towels, with removable waste receptacle.
4. Mounting: Recessed.

    a. Designed for nominal 6-inch wall depth.

5. Minimum Towel-Dispenser Capacity: 600 C-fold or 800 multifold paper towels.
6. Minimum Waste-Receptacle Capacity: 4 gal.
7. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
8. Lockset: Tumbler type for towel-dispenser compartment.

E. Automatic Soap Dispenser:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. Bradley Corporation.

2. Bradley Model #6562.
3. Description: Automatic dispenser with infrared sensor to detect presence of hands; battery powered; designed for dispensing soap in liquid or lotion form.
4. Mounting: Surface wall mounted.
5. Capacity: 30 oz.
   Materials: Stainless steel, No. 4 finish (satin).
6. Refill Indicator: LED indicator.
7. Low-Battery Indicator: LED indicator.

F. Grab Bar:

1. Mounting: Flanges with concealed fasteners.
2. Material: Stainless steel, 0.05 inch thick.

    a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin) on ends and slip-resistant texture in grip area.

3. Outside Diameter: 1-1/4 inches.
4. Configuration and Length: As indicated on Drawings.

G. Sanitary-Napkin Disposal Unit:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Bradley Corporation.

2. Mounting: Recessed.
3. Description: Model #591.
4. Door or Cover: Self-closing, disposal-opening cover.
5. Receptacle: Removable.
6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

H. Seat-Cover Dispenser:

1. Mounting: Surface mounted.
2. Minimum Capacity: 500 seat covers.
3. Exposed Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
4. Lockset: Tumbler type.

I. Mirror Unit:

1. Frame: Stainless steel channel.

a. Corners: Manufacturer's standard.

2. Size: As indicated on Drawings.
3. Hangers: Manufacturer's standard rigid, tamper and theft resistant.

J. Hook:

1. Description: Double-prong unit.
2. Mounting: Concealed.
3. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

K. Baby Changing Station:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Koala Care.

2. Mounting: Surface mounted.
3. Description: KB310-SSWM.

2.3 UNDERLAVATORY GUARDS

A. Underlavatory Guard:

1. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
2. Material and Finish: Antimicrobial, molded plastic, white.

2.4 MATERIALS

A. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.031-inch- minimum nominal thickness unless otherwise indicated.

B. Brass: ASTM B19, flat products; ASTM B16/B16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B30, castings.

C. Steel Sheet: ASTM A1008/A1008M, Designation CS (cold rolled, commercial steel), 0.036-inch- minimum nominal thickness.

D. Galvanized-Steel Sheet: ASTM A653/A653M, with G60 hot-dip zinc coating.

E. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.

F. Fasteners: Screws, bolts, and other devices of same material as accessory unit, unless otherwise recommended by manufacturer or specified in this Section, and tamper and theft resistant where exposed, and of stainless or galvanized steel where concealed.

G. Chrome Plating: ASTM B456, Service Condition Number SC 2 (moderate service).

H. Mirrors: ASTM C1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.5 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

1. Remove temporary labels and protective coatings.

B. Grab Bars: Install to comply with specified structural-performance requirements.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

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B. Clean and polish exposed surfaces according to manufacturer's written instructions.

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SECTION 104413 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fire-protection cabinets for the following:

a. Portable fire extinguisher.

B. Related Requirements:

1. Section 104416 "Fire Extinguishers" for portable, hand-carried fire extinguishers accommodated by fire-protection cabinets

1.3 PREINSTALLATION CONFERENCE

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to fire-protection cabinets, including, but not limited to, the following:

a. Schedules and coordination requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing semi-recessed method and relationships of box and trim to surrounding construction.

B. Shop Drawings: For fire-protection cabinets.

1. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of exposed finish required.

D. Samples for Verification: For each type of exposed finish required, prepared on samples 6 by 6 inches square.

E. Product Schedule: For fire-protection cabinets. Indicate semi-recessed. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.6 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain fire-protection cabinets, accessories, and fire extinguishers from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.

2.3 FIRE-PROTECTION CABINET (FEC)

A. Cabinet Type: Suitable for fire extinguisher.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Babcock-Davis.
    b. JL Industries; Activar Construction Products Group, Inc.
    c. Larsen's Manufacturing Company.

B. Cabinet Construction: Nonrated.

C. Cabinet Material: Aluminum sheet.

1. Shelf: Same metal and finish as cabinet.

D. Semi-Recessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).

1. Square-Edge Trim: 1-1/4- to 1-1/2-inch backbend depth.

E. Cabinet Trim Material: Aluminum sheet and Same material and finish as door.

F. Door Material: Aluminum sheet.

G. Door Style: Center glass panel with frame.

H. Door Glazing: Tempered float glass (clear).

I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide manufacturer's standard.
2. Provide manufacturer's standard hinge, permitting door to open 180 degrees.

J. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Break-Glass Door Handle: Manufacturer's standard, integral to glass with the words "PULL TO BREAK GLASS" applied to handle.
3. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
4. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
5. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.

    a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."

        1) Location: Applied to location indicated on Drawings.
        2) Application Process: Pressure-sensitive vinyl letters.
        3) Lettering Color: Red.
        4) Orientation: Vertical.

6. Alarm: Manufacturer's standard alarm that actuates when fire-protection cabinet door is opened and that is powered by batteries.

K. Materials:

1. Aluminum: ASTM B221 for extruded shapes and aluminum sheet, with strength and durability characteristics of not less than Alloy 6063-T5 for aluminum sheet.

    a. Finish: Baked enamel or powder coat.

b. Color: As selected by Engineer from full range of industry colors and color densities.

2. Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.4 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Miter corners and grind smooth.
3. Provide factory-drilled mounting holes.
4. Prepare doors and frames to receive locks.
5. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
2. Miter and weld perimeter door frames and grind smooth.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where semi-recessed cabinets will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for semi-recessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

1. Fire-Protection Cabinets: 60 inches above finished floor to top of fire extinguisher.

B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Provide inside latch and lock for break-glass panels.
2. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

C. Identification:

1. Apply vinyl lettering at locations indicated.
2. Apply vinyl lettering on field-painted fire-protection cabinets after painting is complete.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413

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SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

B. Related Requirements:

1. Section 104413 "Fire Protection Cabinets."

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to fire extinguishers including, but not limited to, the following:

a. Schedules and coordination requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.7 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure of hydrostatic test according to NFPA 10 when testing interval required by NFPA 10 is within the warranty period.
b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1. Provide fire extinguishers approved, listed, and labeled by FM Global.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Amerex Corporation.
b. JL Industries; Activar Construction Products Group, Inc.
c. Larsen's Manufacturing Company.

2. Source Limitations: Obtain fire extinguishers, fire-protection cabinets, and accessories, from single source from single manufacturer.
3. Valves: Nickel-plated, polished-brass body.
4. Handles and Levers: Stainless steel.

5. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:80-B:C, 10-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

1. Clean-Agent Type in Steel Container: UL-rated 1-A:10-B:C, 10-lb nominal capacity, with HFC blend agent and inert material in enameled-steel container; with pressure-indicating gage. All Fire Extinguishers indicated to be installed in Electrical Rooms or IT/Server Rooms are to be Clean-Agent Type.

2.3 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or black baked-enamel finish.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Amerex Corporation.
b. JL Industries; Activar Construction Products Group, Inc.
c. Larsen's Manufacturing Company.

2. Source Limitations: Obtain mounting brackets and fire extinguishers from single source from single manufacturer.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Engineer.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 INSTALLATION

A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting Brackets: Top of fire extinguisher to be at 60 inches above finished floor.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

3.3 FIELD QUALITY CONTROL

A. Verify that each fire extinguisher is present at Substantial Completion.

END OF SECTION 104416

Division 11

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SECTION 115300 - LABORATORY EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Laboratory equipment.
2. Fume Extractor Arms (Snorkels).
3. Canopy Hoods.
4. Connections to Utilities.
5. Service Fittings and Outlets.

B. Related Requirements:

1. Laboratory Fume Hoods (Owner provided/Contractor Installed) owner shall provide fume hood manufacture data after contract award. Contractor shall install owner provided fume hoods.
2. Section 123553.13 “Metal Laboratory Casework” for base and wall mounted casework.
3. Various Sections in Division 22 “Plumbing,” Division 23 “Heating Ventilating and Air Conditioning,” and Division 26 “Electrical” for utilities required by laboratory equipment included in this Section.

1.3 ABBREVIATIONS

A. Owner Removed/Owner Reinstalled (OROR).

B. Owner Removed/Contractor Reinstalled (ORCR).

C. Contractor Removed/Contractor Reinstalled (CRCR).

D. Contractor Furnished/Contractor Installed (CFCI).

1.4 COORDINATION

A. Work in this Section requires close coordination with Work in electrical and mechanical sections. Coordinate Work to assure an orderly progress in the project, without removal of previously installed Work, and to prevent damage to finishes and products

B. Leave building openings of sufficient size to permit transport of equipment to final position.

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1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Submit equipment dimensions and construction, equipment capacities, physical dimensions, utility and service requirements and locations.
2. Include rated capacities, operating characteristics, furnished specialties and accessories, finishes anchorage methods, desired clearances, and utility locations for each piece of laboratory equipment.

B. Shop Drawings: For each laboratory equipment and for special components not dimensioned or detailed in manufacturer's product data.

1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, locations, and sizes of each piece of equipment.
3. Indicate equipment access points and required space for equipment service and operation.
4. Include installation drawings indicating rough-ins for plumbing, wiring, piping, ventilating and service requirements.
5. Include diagrams for power, signal, and control wiring.

C. Samples: Submit two samples of each type of specified finish and color range where applicable.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of laboratory equipment.

C. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For laboratory equipment to include in operation and maintenance manuals.

B. Project Record Documents: Record actual locations of concealed utility connections.

C. Operation and Maintenance Data:

1. Submit description of equipment operation, adjusting, and required testing.
2. Identify system maintenance requirements, servicing cycles, required lubrication types, and local spare-parts sources.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

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1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver each item in manufacturer's packaging and crating with contents clearly identified and properly marked.

B. Store and protect materials according to manufacturer instructions.

1. Protect finished surfaces during handling and installation with protective covering of polyethylene film or another suitable material. Use means necessary to protect equipment before, during, and after installation. Protect the installed Work and materials of other trades during installation of this Work.
2. Store and handle each item to prevent damage. Provide temporary skids under items weighing more than 150 pounds.

C. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

D. In the event of damage, immediately make repairs or replacements necessary to satisfaction of Owner.

1.10 FIELD CONDITIONS

A. Review surfaces and conditions under which equipment is to be installed. Verify measurement of space for equipment and means of access for installation. Verify that service rough ins and backing plates are in place.

B. Report to Owner's Representative in writing, items that may be detrimental to equipment or equipment operation.

1.11 WARRANTY

A. Manufacturer’s Warranty: Submit written warranty covering structural failure, warping, and finish integrity of materials and workmanship for warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

1.12 MAINTENANCE SERVICE

A. Cost of maintenance agreement shall be a separate line item and not factored into the cost of equipment. Vendor shall guarantee that Owner will receive no adverse treatment regarding parts if Owner chooses not to purchase maintenance service agreement.

B. Equipment supplier shall provide a technical response, actual presence or by telephone, within 4 hours or the service call will be provided without additional cost to Owner.

C. Equipment supplier shall provide diagnostic equipment necessary for maintenance.

D. Maintenance Service: Two years from Substantial Completion.

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PART 2 - PRODUCTS

2.1 Owner shall relocate laboratory equipment and reinstall after construction is complete.

2.2 LABORATORY EQUIPMENT, GENERAL

A. Provide equipment complete with necessary supports, anchorages, stands, gages, valves, parts, and accessories required for a complete operating installation.

B. Provide each item of equipment with internal electrical services necessary for proper operation including wiring, conduit, boxes, raceways, fittings, lamps, switches, device plates, etc., sized for single point connection to building services, complying with requirements of NEC and bearing UL labeling as required.

C. Provide each item of equipment with mechanical and plumbing services necessary for proper operation including piping, fittings, ductwork, troughs, accessories, and materials, installed for easy access and connection to respective building service.

D. Provide each item of equipment fully finished by manufacturer with no additional finish or painting required after installation.

E. Identified equipment shall be provided by Contractor. Refer to Drawings for equipment locations and equipment list.

2.3 FUME EXTRACTOR ARMS (SNORKELS)

A. Manufacturers: All snorkel fume extractors to be the products of a single manufacturer.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Movex Inc. “ME STD Extractor Arm.” Available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Airflow Systems, Inc.
b. Alsident System, distributed by Laboratory Enterprises, Inc.
c. Enviroflex International Inc.
d. Nederman Inc.
e. Plymovement Corporation.

B. Construction: Polypropylene joints and thin-wall anodized aluminum tubes. Hinged, self-supporting air extractor arm assembly. Arm to consist of 360-degree swivel elbow, support flange, internal support, pre-set joints with adjustable wear discs and flange for exhaust duct.

C. Airflow: 125 CFM.

D. Hose Diameter: 4 inches.

E. Accessories: Ceiling mounting bracket with transparent dome hood and cover plate for use in suspended ceilings.

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2.4 CANOPY HOODS

A. Manufacturers: All canopy hoods to be the products of a single manufacturer.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Fisher Scientific.
b. Hamilton Laboratory Solutions, LLC.
c. Kewaunee Scientific Corporation.
d. Labconco.
e. Mott Manufacturing, Ltd.

B. Construction: Canopy hoods to be constructed with all-welded, liquid-tight joints, flat back and sides, flat vertical front edge sloping back to a flat top with integral duct collar for attachment to exhaust systems shown on the HVAC drawings and as specified in Division 23.

C. Material: Steel Sheet: Cold-rolled, commercial steel (CS) sheet, 0.048 inch thick, complying with ASTM A1008/A1008M; matte finish; suitable for exposed applications.

D. Mounting: Wall-mounted at the rear face with integral attachment points along the front for stainless steel threaded rods which will be supported from structure above.

E. Accessories:

1. LED light fixture.

a. LED module and driver combination for 5,900 lumens at 4,000 k color temperature.
b. Efficiency of fixture to be 120 lumens per watt.
c. Life expectancy of 50,000 hours.

F. Finish: Manufacturer’s standard baked-on or powder coated finish.

1. Colors for Canopy Hood Finish: As selected by Engineer from manufacturer’s full range to match existing canopy hoods.

2.5 ACCESSORIES

A. Rough-in Equipment: Furnish frames, anchors, supports, accessories, and closure trim for scheduled equipment.

2.6 FABRICATION

A. Fabricate laboratory equipment according to manufacturer’s standard processes; however, make modifications from standard product where necessary to comply with project requirements.

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2.7 SOURCE QUALITY CONTROL

A. Equipment may be inspected by Owner's Representative at manufacturer's plant prior to shipment. Equipment found not to be in accordance with Specifications and approved drawings may be rejected. Rejected equipment shall be corrected or replaced with new products.

B. Furnish shop inspection for equipment items.

C. Certificate of Compliance:

1. If fabricator is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
2. Specified shop tests are not required for Work performed by approved fabricator.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, clearances, service rough-ins, and other conditions affecting performance of the Work.

B. Examine walls, floors, and chutes for suitable conditions where each laboratory equipment will be installed.

C. Verify measurement of space for equipment and means of access for installation. Verify that service rough-ins and backing plates are in place.

D. Verify that rough-in frames, anchors, and supports are accurately placed.

E. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install each laboratory equipment according to manufacturer’s written instructions.

B. Set laboratory equipment square, level, plumb, properly aligned, and securely in place. Anchor as required for secure operation.

C. Install equipment in accordance with accepted submittals, as necessary for the intended function, and as a complete operating system.

1. According to standards required by authorities having jurisdiction.
2. Install per manufacturer’s engineered seismic anchorage details.

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3. Prepare for final connection of equipment to mechanical and electrical Work by others, unless otherwise noted.
4. Install in locations shown on Drawings.

D. Sequence installation to accommodate required utility connections.

E. Touch up surfaces with minor damage caused during installation and replace damaged components.

3.3 FIELD QUALITY CONTROL

A. Perform manufacturer's standard tests and inspections with the assistance of a factory-authorized service representative to verify compliance with performance requirements.

B. A laboratory equipment will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust equipment and services to operate correctly and smoothly without warp or bind. Lubricate operating parts as recommended by manufacturer.

B. Clean and polish exposed surfaces in accordance with manufacturer's instruction.

C. Touch up and restore any factory finishes partially damaged or defaced during delivery, relocation, and installation. Repair or remove and replace defective work with new equipment as approved by Owner's Representative.

D. Protect installed equipment after installation and during remainder of construction.

3.5 DEMONSTRATION AND TRAINING

A. Provide a hands-on, start-up session, and operation and maintenance training sessions with supplier, 6 maintenance personnel, and 6 end users in lab spaces where installation took place.

B. Training Session Time: Minimum of 8 hours of instruction, questions, and answers.

C. Owner is permitted to videotape various training sessions for their own use.

3.6 CANOPY HOOD SCHEDULE

A. Extraction Hood LB-CHV-03:

1. Length: 13 feet 6 inches.
2. Width: 4 feet 0 inches.
3. Height: As indicated on Drawings.

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SECTION 123553.13 - METAL LABORATORY CASEWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal laboratory casework.
2. Utility-space framing at backs of base cabinets.
3. Filler and closure panels.
4. Laboratory casework system that includes support and utility-space framing, filler and closure panels, and modular countertops.
5. Laboratory countertops.
6. Tables.
7. Shelves.
8. Laboratory sinks.
9. Laboratory accessories.
10. Water, laboratory gas, and electrical service fittings.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood blocking for anchoring laboratory casework.
2. Section 092216 "Non-Structural Metal Framing" for reinforcements in metal-framed partitions for anchoring laboratory casework.
3. Section 096500 "Resilient Flooring" for resilient rubber base applied to laboratory casework.
4. Various Division 22 Sections and plumbing fixture schedules on Drawings for plumbing utilities, fixtures, and accessories to be mounted on laboratory casework.
5. Various Division 26 Sections and electrical fixture schedules on Drawings for electrical utilities, fixtures, and accessories to be mounted on laboratory casework.

1.3 REFERENCES

A. Scientific Equipment & Furniture Association (SEFA):

1. SEFA 1 Laboratory Fume Hoods.
2. SEFA 2.3 Scientific Laboratory Furniture and Equipment.
3. SEFA 3 Work surfaces.
4. SEFA 7 Laboratory and Hospital Fixtures.
5. SEFA 8 Laboratory Furniture-Casework-Shelving and Tables – Recommended Practices.

B. ASTM International (ASTM):

1. A240-Heat Resistant Chromium and Chromium – Nickel Stainless Steel Plate, Sheet, and Strip for pressure Vessels.
2. A312-Seamless and Welded Austenitic Stainless-Steel Pipe.

C. Builders Hardware Manufacturers Association (BHMA).

D. National Electrical Manufacturers Association (NEMA).

E. National Fire Protection Association (NFPA) 30 Flammable Liquid Storage.

F. National Fire Protection Association (NFPA) 70 Electrical Components, Devices and Accessories.

G. Underwriters Laboratory (UL): UL962 Certification.

H. CDC 21-1112 (2009) Biosafety in Microbiological and Biomedical Laboratories, 5th Edition.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

B. Keying Conference: Conduct conference at Project site . Incorporate keying conference decisions into final keying requirements.

1.5 COORDINATION

A. Coordinate layout and installation of framing and reinforcements for support of laboratory casework.

B. Coordinate installation of laboratory casework with installation of laboratory equipment.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For laboratory casework.

1. Include plans, elevations, sections, and attachments to other work including blocking and reinforcements required for installation.
2. Indicate types and sizes of casework.
3. Indicate manufacturer's catalog numbers for casework.
4. Show fabrication details, including types and locations of hardware.
5. Indicate locations and types of service fittings.
6. Include details of utility spaces showing supports for conduits and piping.
7. Include details of support framing system.
8. Include details of exposed conduits, if required, for service fittings.

9. Indicate locations of and clearances from adjacent walls, doors, windows, other building components, and laboratory equipment.
10. Include coordinated dimensions for laboratory equipment specified in other Sections.

C. Keying Schedule: Include schematic keying diagram and index each key set to unique designations that are coordinated with the Contract Documents.

D. Samples for Initial Selection: For casework finishes and materials requiring color selection.

E. Samples for Verification: For each type of casework, exposed-hardware, and countertop-material finish, in 6-inch square samples.

1.7 DELEGATED DESIGN

A. Calculations and Details: Submit structural calculations and details by a licensed structural engineer for seismic anchorage of casework systems as required by local authority having jurisdiction.

1.8 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

B. Product Test Reports:

1. Casework: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of laboratory casework with requirements of specified product standard and system structural performance specified in "Performance Requirements" Article.
2. Countertop Surface Material: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of laboratory countertop surface material with requirements specified for chemical and physical resistance.

1.9 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish complete touchup kit for each type and color of casework finish provided. Include fillers, primers, paints, and other materials necessary to perform permanent repairs to damaged laboratory casework finish.

B. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Cabinet Mounting Clips and Related Hardware: Quantity equal to 5 percent of amount installed, but no fewer than 20 of each type.
2. Modular Countertop Units: Two extra units of each length and material installed.

1.10 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that produces casework of types indicated for this Project that has been tested for compliance with SEFA 8 M.

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer. The installer must demonstrate and prove their ability to produce and install projects of similar sizes and scope.

C. Engineer Qualifications: Licensed structural engineer registered in State where project is located.

D. Testing: Laboratory casework manufacturer to provide in their initial submittals, certified test reports indicating compliance of their laboratory casework finish and work surface materials with requirements specified for chemical and physical resistance, and confirmation of load performance for movable tables. Perform material test reports by an independent testing agency qualified for testing indicated, as documented according to ASTM E548.

E. Though products may be manufactured by different manufacturers, obtain and install all casework, including work surfaces, sinks, service fittings and accessories, and fume hoods through one source from a single Laboratory Furniture Contractor.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Protect finished surfaces during handling and installation with protective covering of polyethylene film or other suitable material.

1.12 FIELD CONDITIONS

A. Established Dimensions: Where laboratory casework is indicated to fit to other construction, establish dimensions for areas where casework is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

B. Field Measurements: Where laboratory casework is indicated to fit to existing construction, verify dimensions of existing construction by field measurements before fabrication and indicate measurements on Shop Drawings. Provide fillers and scribes to allow for trimming and fitting.

C. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before enclosing them and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Alpha Adaptable casework system by Kewaunee Scientific Corporation or a comparable product by one of the following:

1. Hamilton Laboratory Solutions, LLC.
2. Lab Crafters, Inc.
3. Mott Manufacturing Ltd.

B. Source Limitations: Obtain laboratory casework from single source from single manufacturer unless otherwise indicated.

C. Product Designations: Drawings indicate sizes and configurations of laboratory casework by referencing designated manufacturer's catalog numbers. Other manufacturers' laboratory casework of similar sizes and similar door and drawer configurations and complying with Specifications may be considered.

2.2 PERFORMANCE REQUIREMENTS

A. System Structural Performance: Ensure laboratory casework and support framing system withstands the effects of the following gravity loads and stresses without permanent deformation, excessive deflection, or binding of drawers and doors:

1. Support Framing System: 600 lb/ft.
2. Suspended Base Cabinets (Internal Load): 160 lb/ft.
3. Work Surfaces (Including Tops of Suspended Base Cabinets): 160 lb/ft.
4. Wall Cabinets (Upper Cabinets): 160 lb/ft.
5. Shelves: 40 lb/sq. ft.

B. Seismic Performance: Ensure laboratory casework installation withstands the effects of earthquake motions determined according to ASCE/SEI 7.

1. Design earthquake spectral response acceleration, short period (Sds) for Project is indicated on Drawings.
2. Component Importance Factor: 1.5.
3. Base Cabinet Load (Including Countertop and Load on Countertop): 320 lb/ft.
4. Wall Cabinet (Upper Cabinet) Load: 160 lb/ft.
5. Shelves: 40 lb/ft.

2.3 CASEWORK, GENERAL

A. Casework Product Standard: Comply with SEFA 8 M, "Laboratory Grade Metal Casework."

B. Flammable Liquid Storage: Where cabinets are indicated for solvent or flammable liquid storage, provide units that are listed and labeled as complying with requirements in NFPA 30 by

a testing and inspecting agency acceptable to authorities having jurisdiction, meeting O.S.H.A. Standard 1910-106(d)(3), and be UL 1275 certified.

1. Make cabinets of 18-gauge thick cold rolled steel with double wall construction with fireproof insulation in walls, floor, and top. Make floor of galvanized steel and be recessed 2 inches below front opening of cabinet. Weld four corners to form a liquid-tight well.
2. Equip cabinets with four 5/16-inch diameter threaded bolt type steel levelers as on standard base cabinets.
3. Supply back of each cabinet with two 1-1/2-inch fire baffle vents.
4. Equip each cabinet with an adjustable galvanized 16 gage steel shelf at 2-inch increments.
5. Label each cabinet "FLAMMABLE - KEEP FIRE AWAY" for clear identification.
6. Provide doors that overlap cabinet frame and having a full-length piano hinge with a fire-resistant gasket around entire door opening for a tight closing. Include handle having a three-point locking mechanism.

C. Acid Storage Cabinets: Provide cabinets having same construction as standard base cabinets.

1. Acid Storage-Cabinet Lining: One-piece white chemical resistant 3/8-inch-thick, polyethylene, polypropylene, or epoxy lining material and meet OSHA standards for secondary containment.
2. Air Grills: Provide at top and bottom of each door for air circulation.
3. Each unit comes with an adjustable double-wall white chemical resistant polyethylene (HDPE) perforated shelf with stainless steel hat channel reinforcement.
4. Label each cabinet "ACIDS - DANGER" or “CORROSIVES - DANGER” for clear identification.
5. Make hardware of stainless steel.
6. Vent each cabinet with a 1-1/2-inch diameter vent pipe having a positive airflow directly into fume hood exhaust system.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.4 METAL CASEWORK MATERIALS

A. Steel Sheet: Cold-rolled, commercial steel (CS) sheet, complying with ASTM A1008/A1008M; matte finish; suitable for exposed applications.

B. Nominal Metal Thickness:

1. Sides, Ends, Fixed Backs, Bottoms, Tops, Soffits, and Items Not Otherwise Indicated: 0.048 inch. Except for flammable liquid storage cabinets, bottoms may be 0.036 inchif reinforced.
2. Back Panels, Doors, Drawer Fronts and Bodies, and Shelves: 0.036 inchexcept 0.048 inch for back panels and doors of flammable liquid storage cabinets and for unreinforced shelves more than 36 incheslong.
3. Intermediate Horizontal Rails, Table Aprons and Cross Rails, Center Posts, and Top Gussets: 0.060 inch.
4. Drawer Runners, Sink Supports, and Hinge Reinforcements: 0.075 inch.

5. Leveling and Corner Gussets: 0.105 inch.

C. Stainless Steel Sheet: ASTM A 240/A 240M, Type 316L with #4 satin finishes.

2.5 AUXILIARY CABINET MATERIALS

A. Tempered Glass for Glazed Doors: Clear tempered glass complying with ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality-Q3; not less than 5.0 mm thick.

2.6 CABINET HARDWARE

A. General: Provide laboratory casework manufacturer's standard, commercial-quality, heavy-duty hardware complying with requirements indicated for each type.

B. Hinges: Stainless steel, five-knuckle hinges complying with BHMA A156.9, Grade 1, with antifriction bearings and rounded tips. Provide two for doors 48 incheshigh or less and three for doors more than 48 incheshigh.

C. Hinged-Door and Drawer Pulls: Solid stainless steel**,** back-mounted pulls; provide two pulls for drawers more than 24 incheswide.

1. Design: Wire pulls.
2. Overall Size: 1-3/8 by 5-1/2 inches.

D. Drawer Slides: ANSI/BHMA A156.9.

1. Manufacturer's standard.
2. Heavy Duty (Grade 1HD-100): Side mount.
    a. Type: Full overtravel extension.
    b. Material: Epoxy-coated polymer slides.
    c. Motion Feature: Soft close dampener.
3. General-purpose drawers; provide 100 lb load capacity.
4. File drawers; provide 150 lb load capacity.

E. Locks: Cam or half-mortise type, brass with chrome-plated finish; complying with BHMA A156.11, Type E07281, Type E07111, or Type E07021.

1. Tumbler: Disc.
2. Lock Locations: Provide where indicated on drawers and doors.
3. Keying: Key locks alike within each room; key each room separately.
    a. Master key for up to 225 key changes.
4. Key Quantity: Minimum of two keys per lock.
5. Master Key System: Key locks to be operable by master key.
    a. Master Keys: Provide two.

F. Sliding-Door Hardware Sets: Laboratory casework manufacturer's standard, to suit type and size of sliding-door units.

2.7 COUNTERTOP AND SINK MATERIALS

A. Epoxy: Factory-molded, modified epoxy-resin formulation with smooth, nonspecular finish.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or equal:

   a. American Epoxy Scientific LLC.
   b. Durcon; a Wilsonart Company.

2. Physical Properties:

   a. Flexural Strength: Not less than 10,000 psi.
   b. Modulus of Elasticity: Not less than 2,000,000 psi.
   c. Hardness (Rockwell M): Not less than 100.
   d. Water Absorption (24 Hours): Not more than 0.02 percent.
   e. Heat Distortion Point: Not less than 260 deg F.

3. Chemical Resistance: Epoxy-resin material has the following ratings when tested with indicated reagents according to NEMA LD 3, Test Procedure 3.4.5:

   a. No Effect: Acetic acid (98 percent), acetone, ammonium hydroxide (28 percent), benzene, carbon tetrachloride, dimethyl formamide, ethyl acetate, ethyl alcohol, ethyl ether, methyl alcohol, nitric acid (70 percent), phenol, sulfuric acid (60 percent), and toluene.
   b. Slight Effect: Chromic acid (60 percent) and sodium hydroxide (50 percent).

4. Color: Black.
5. Thickness: 1 inch.
6. Back and Side Splashes: Supplied loose, cut to size for field applications in the same material and thickness as countertops. Bond backsplash and end splash curbs to countertops at jobsite with epoxy resin adhesive.

2.8 SHELVING MATERIALS

A. Phenolic Composite: Solid, high-pressure decorative laminate, complying with NEMA LD 3, Grade CGS, and SEFA 3-2010.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Duracon.
   b. Fundermax.
   c. Trespa North America.

2. Chemical Resistance: Composite countertop material has the following ratings when tested with indicated reagents according to NEMA LD 3, Test Procedure 3.4.5 and SEFA 3-2010:

    a. No Effect: Acetic acid (98 percent), acetone, ammonium hydroxide (28 percent), ethyl acetate, ethyl alcohol, formaldehyde (37 percent), furfural, phosphoric acid (85 percent), sulfuric acid (33 percent), toluene, benzene, carbon tetrachloride, dimethyl formamide, hydrochloric acid (37 percent), hydrofluoric acid (48 percent), nitric acid (30 percent), sodium hydroxide (20 percent), and zinc chloride.

3. Color: Black.
4. Thickness: 3/4 inch.
5. Edges and Corners: Exposed work surface edges and corners with 1/8-inch machined beveled top edge with blended bevel corners.

B. Shelving Wall Hanging System:

1. Basis-of-Design: 1-inch Alpha Wall Hanging System as manufactured by Kewaunee Scientific Corporation.
2. Provide complete system that is fully adjustable and includes following as a minimum:

    a. Vertical Uprights: Double-slotted face with slots on 1-inch centers.
    b. Support Rails: Notch on 6-inch centers to accepted vertical upright.
    c. Support Rail Covers: Provide in pairs to match vertical upright spacing.
    d. System Height: Countertop height, manufacturer's standard.
    e. Shelves: Manufacturer's standard gage painted steel, 9-inch depth by 36-inch length with optional locking tab.

2.9 METAL CABINETS AND TABLES

A. Fabrication: Assemble and finish units at point of manufacture. Use precision dies for interchangeability of like-size drawers, doors, and similar parts. Perform assembly on precision jigs to provide units that are square. Reinforce units with angles, gussets, and channels. Except where otherwise specified, integrally frame and weld cabinet bodies to form dirt- and vermin-resistant enclosures. Where applicable, reinforce base cabinets for sink support. Maintain uniform clearance around door and drawer fronts of 1/16 to 3/32 inch.

1. Provide minimum metal gauges used in casework fabrication of following as per recognized North American standards.

    a. Top front rails of the cabinets: 11 gauge.
    b. Leveling devices and drawer suspension tracks: 14 gauge.
    c. Drawer boxes, drawer front's interior and exterior panels, and door interior panels: 20 gauge.
    d. Other cabinet components including cabinet frames, doors, and shelves: 18 gauge.

B. Flush Doors: Outer and inner pans that nest into box formation, with full-height channel reinforcements at center of door. Fill doors with noncombustible, sound-deadening material.

C. Glazed Doors: Hollow-metal stiles and rails of similar construction as flush doors, with glass held in resilient channels or gasket material.

D. Hinged Doors: Mortise for hinges and reinforce with angles welded inside inner pans at hinge edge.

E. Drawers: Fronts made from outer and inner pans that nest into box formation, without raw metal edges at top. Sides, back, and bottom fabricated in one piece with rolled or formed top of sides for stiffening and comfortable grasp for drawer removal. Provide drawers with rubber bumpers, polymer roller slides, and positive stops to prevent metal-to-metal contact or accidental removal.

F. Adjustable Shelves: Front, back, and ends formed down, with edges returned horizontally at front and back to form reinforcing channels.

G. Toe Space: Fully enclosed, 4 incheshigh by 3 inchesdeep, with no open gaps or pockets.

H. Tables: Welded tubing legs, not less than 2 inchessquare with channel stretchers as needed to comply with product standard. Weld or bolt stretchers to legs and cross-stretchers, and bolt legs to table aprons. Provide leveling device welded to bottom of each leg.

1. Leg Shoes: Satin-finished, stainless steel, open-bottom, slip-on type.

I. Utilities: Provide space, cutouts, and holes for pipes, conduits, and fittings in cabinet bodies to accommodate utility services and their support-strut assemblies.

1. Provide base cabinets with removable backs for access to utility space.

J. Utility-Space Framing: Steel framing units consisting of two steel slotted channels complying with MFMA-4, not less than 1-5/8 inchessquare by 0.105-inchnominal thickness, that are connected at top and bottom by U-shaped brackets made from 1-1/4-by-1/4-inchsteel flat bars. Framing units may be made by welding channel material into rectangular frames instead of using U-shaped brackets.

K. Filler and Closure Panels: Provide where indicated and as needed to close spaces between casework and walls, ceilings, and equipment. Fabricate from same material and with same finish as casework and with hemmed or flanged edges unless otherwise indicated.

1. Provide knee-space panels (modesty panels) at spaces between base cabinets, where cabinets are not installed against a wall or where space is not otherwise closed. Fabricate from back-to-back panels or of hollow construction to eliminate exposed hemmed or flanged edges.
2. Provide utility-space closure panels at spaces between base cabinets where utility space would otherwise be exposed, including spaces below countertops.
3. Provide closure panels at ends of utility spaces where utility space would otherwise be exposed.

2.10 MOBILE TABLES

A. Basis-of-Design Product: Subject to compliance with requirements, provide Altus Table system by Mott Manufacturing Ltd. or a comparable product by one of the following:

1. Hamilton Laboratory Solutions, LLC.
2. Lab Crafters, Inc.
3. Kewaunee Scientific Corporation

B. Modular system to be made of tubular style framing combined with rectangular formed steel uprights.

1. Nominal table assembly dimensions:

a. MB-1: 120 inches.
b. MB-2: 96 inches.

C. Tubular frames and table supports to be adjustable height in 1 inch increments and complete with levelers.

1. Height adjustable from 29 to 36 inches, not including work surface.

D. Rear frame to be used for carrying services and electrical conduit.

1. Rear upright supports to be equipped with slots for adjustable shelving and levelers.
2. All services supplied with hose and quick disconnect to reach service fitting supplies.

E. Assembled frame to be self-supporting without being anchored to building.

F. Wire management tray to be under countertop.

1. Refer to countertop article for material.

G. Service Fixtures:

1. Side upright structure to support maximum of three service fixtures on each side.
2. Fixtures to be needle valve style with single serrated hose.
3. Combustible gas tubing to be stainless steel.
4. Service fixtures to have additional 4 feet of length to reach service fitting supplies.
5. Arrange plumbing so services cannot be intermixed.

2.11 LABORATORY CASEWORK SYSTEM

A. Provide casework manufacturer's standard integrated system that includes support framing, suspended modular cabinets, filler and closure panels, undercabinet task-lighting fixtures, countertops, and fittings needed to assemble system. System includes hardware and fasteners for securing support framing to permanent construction.

1. Cabinets can be removed and reinstalled without use of special tools for relocation within system.

2. Base cabinets can be removed without providing temporary support for, or removing, countertops.
3. Sinks are supported independent of base cabinets.
4. Support framing has provision for fastening pipe supports at utility space in not more than 1-inch increments.
5. System includes filler and closure panels to close spaces between support framing, cabinets, shelves, countertops, floors, and walls unless otherwise indicated. Fabricate panels from same material and with same finish as metal cabinets and with hemmed or flanged edges.

B. Support Framing: Casework manufacturer's standard system consisting of vertical supports and connecting braces and rails as follows:

1. Cabinets, shelves, and countertops are supported from vertical supports except where floor-supported base cabinets are indicated. Vertical positioning of supported cabinets, shelves, and countertops can be varied in 1-inch increments through full height of supports.
2. Vertical supports rest on adjustable leveling bases and are secured to floor with metal clips fastened to floor.
3. Vertical supports are installed with braces and rails, connecting them to each other and to permanent building walls to create a stable, rigid structure with framed utility spaces where indicated.

C. Undercabinet Task-Light Luminaires:

1. Lamp Type: LED with switch and heavy-duty cord and plug.
2. Finish: Baked enamel.
3. Diffusers: Virgin acrylic with high resistance to yellowing and other changes from aging, heat, and UV radiation.

D. Countertops: Provide in modular lengths indicated, without seams.

2.12 METAL CABINET FINISH

A. General: Prepare, treat, and finish welded assemblies after assembling. Prepare, treat, and finish components that are to be assembled with mechanical fasteners before assembling. Prepare, treat, and finish concealed surfaces same as exposed surfaces.

B. Preparation: After assembly, clean surfaces of mill scale, rust, oil, and other contaminants. After cleaning, apply a conversion coating suited to organic coating to be applied over it.

C. Chemical-Resistant Finish: Immediately after cleaning and pretreating, apply laboratory casework manufacturer's standard two-coat, chemical-resistant, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.

1. Chemical and Physical Resistance of Finish System: Finish complies with acceptance levels of cabinet surface finish tests in SEFA 8 M. Verify acceptance level for chemical spot test is no more than for Level 3 conditions.

2. Colors for Metal Laboratory Casework Finish: As selected by Engineer from manufacturer's full range.

2.13 COUNTERTOPS, TABLETOPS, SHELVES, AND SINKS

A. Countertops, General: Provide units with smooth surfaces in uniform plane, free of defects. Make exposed edges and corners straight and uniformly beveled. Provide front and end overhang of 1 inch.

B. Sinks, General: Provide sizes indicated or laboratory casework manufacturer's closest standard size of equal or greater volume, as approved by Engineer.

1. Outlets: Provide with strainers and tailpieces, NPS 1-1/2, unless otherwise indicated.
2. Overflows: For each sink except cup sinks, provide overflow of standard beehive or open-top design with separate strainer. Height 2 inchesless than sink depth. Provide in same material as strainer.

C. Epoxy Countertops, Tabletops, and Sinks:

1. Countertop Fabrication: Fabricate with factory cutouts for sinks, holes for service fittings and accessories, and butt joints assembled with epoxy adhesive and concealed metal splines.

a. Flat Configuration: 1 inch thick with continuous drip groove on underside 1/2 inch from overhang edge.

1) Edges and Corners: Beveled.
2) Backsplash: Applied.

b. Construction: Uniform throughout full thickness.

2. Sink Fabrication: Molded in one piece with smooth surfaces, coved corners, and bottom sloped to outlet; 1/2-inch minimum thickness.

a. Provide with polypropylene strainers and tailpieces.
b. Provide integral sinks in epoxy countertops, bonded to countertops with invisible joint line.
c. Provide epoxy resin sinks for drop-in installation in countertops with 1/4-inch-thick lip around perimeter of sink.
d. Provide manufacturer's recommended adjustable support system for table- and cabinet-type installations.

D. Phenolic-Composite Shelves:

1. Shelf Configuration: Flat, 3/4 inch thick.

a. Edges and Corners: Beveled.

E. Cup Sinks, “CS-1”: Provide in material indicated, 3-by-6-inch oval.

1. Epoxy Cup Sinks: Provide with polypropylene strainers and integral tailpieces.

2.14 LABORATORY ACCESSORIES

A. Reagent Shelves: Provide as indicated, fabricated from same material as adjacent countertop unless otherwise indicated.

B. Burette Rods: Aluminum or stainless steel rods, 1/2 inch in diameter and 18 inches long, threaded on one end to fit tapered plug adapter for flush socket receptacle. Provide with tapered plug adapter and receptacle.

C. Upright Rod Assembly and Metal Crossbar: Aluminum or stainless steel. Two vertical rods and one horizontal crossbar, 3/4 inch in diameter and 36 inches long unless otherwise indicated; two flush socket receptacles and two crossbar clamps. Ends of vertical rods are tapered to fit receptacles; other rod ends are rounded.

D. Greenlaw Arm Assembly: Aluminum or stainless steel vertical rod, tapered on one end to fit flush socket receptacle. Adjustable crossbar of hardwood with black, acid-resistant finish, secured to upright with adjustable clamp. Provide with receptacle.

E. Lattice Assembly: Aluminum or stainless steel, vertical and horizontal rod lattice assembly with 3/4-inch-diameter rods at approximately 12 inches o.c. with two flush socket receptacles for mounting.

1. Size: 36 inches wide by 24 inches high.

F. Stainless Steel Pegboards: Stainless steel pegboards with removable polypropylene pegs and stainless steel drip troughs with drain outlet.

G. Surface-mounted paper towel dispenser and waste receptacle: stainless steel with all-welded construction. Exposed surfaces to have satin finish.

2.15 WATER AND LABORATORY GAS SERVICE FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Broen A/S.
2. Chicago Faucets; Geberit Group.
3. WaterSaver Faucet Co.

B. Service Fittings: Provide units that comply with SEFA 7, "Recommended Practices for Fixtures." Provide fittings complete with washers, locknuts, nipples, and other installation accessories. Include wall and deck flanges, escutcheons, handle extension rods, and similar items.

1. Provide units that comply with "Vandal-Resistant Faucets and Fixtures" recommendations in SEFA 7.

C. Materials: Fabricated from cast or forged red brass unless otherwise indicated.

1. Reagent-Grade Water Service Fittings: Polypropylene, PVC, or PVDF for parts in contact with water.

D. Finish: Acid- and solvent-resistant powder coating complying with requirements in SEFA 7 for corrosion-resistant finishes.

1. Provide chemical-resistant powder coating in laboratory casework manufacturer's standard metallic brown, aluminum, white, or other color as approved by Engineer.

E. Water Valves and Faucets: Provide units complying with ASME A112.18.1, with renewable seats, designed for working pressure up to 80 psig.

1. Vacuum Breakers: Provide ASSE 1035 vacuum breakers on water fittings with serrated outlets.
2. Aerators: Provide aerators on water fittings that do not have serrated outlets.
3. Self-Closing Valves: Provide self-closing valves where indicated.

F. Ball Valves: Chrome-plated ball and PTFE seals. Handle requires no more than 5 lbfto operate. Provide units designed for working pressure up to 75 psig, with serrated outlets.

1. Locking Safety Handles: Where ball valves are indicated for fuel-gas use, provide handles that must be pushed in or pulled up before being turned on.

G. Needle Valves: Provide units with renewable, self-centering, floating cones and renewable seats of stainless steel or Monel metal, with removable serrated outlets.

1. Provide units designed for working pressure up to 100 psig.

H. Hand of Fittings: Furnish right-hand fittings unless fitting designation is followed by "L."

I. Remote-Control Valves: Provide needle valves, straight-through or angle type as indicated for fume hoods and where indicated.

J. Handles: Provide three- or four-wing, molded-plastic or powder-coated-metal handles for valves unless otherwise indicated.

1. Provide lever-type handles for ball valves unless otherwise indicated. Lever handle aligns with outlet when valve is closed and is perpendicular to outlet when valve is fully open.
2. Provide knurled, molded-plastic handles for needle valves.
3. Provide wrist blade handles on accessible fitting locations.

K. Service-Outlet Identification: Provide color-coded plastic discs with embossed identification, secured to each service-fitting handle to be tamper resistant. Comply with SEFA 7 for colors and embossed identification.

2.16 ELECTRICAL AND COMMUNICATION SERVICE FITTINGS

A. Service Fittings, General: Provide units complete with metal housings, receptacles, switches, pilot lights, data communication outlets, cover plates, accessories, and gaskets required for mounting on laboratory casework.

B. Electrical Wiring Devices: Comply with requirements in Section 262726 "Wiring Devices" for receptacles, switches, pilot lights, cover plates, and accessories.

C. Receptacles:

1. Duplex Convenience Receptacles: 125 V, 20 A; NEMA WD 6, Configuration 5-20R.

    a. Standards: Comply with NEMA WD 1, UL 498, and FS W-C-596.

2. Hospital-Grade, Duplex Convenience Receptacles: 125 V, 20 A; NEMA WD 6, Configuration 5-20R.

    a. Standards: Comply with NEMA WD 1, UL 498 Supplement sd, and FS W-C-596.

3. Isolated-Ground, Duplex Convenience Receptacles: 125 V, 20 A; NEMA WD 6, Configuration 5-20R.

    a. Standards: Comply with NEMA WD 1, UL 498, and FS W-C-596.

4. Tamper-Resistant, USB Charger Receptacles: 12 V dc, 2.0 A, USB Type A.

    a. Standards: Comply with NEMA WD 1, UL 498, UL 1310, and FS W-C-596.
    b. USB Receptacles: Dual, Type A.

5. Hospital-Grade, USB Charger Receptacles: 12 V dc, 2.0 A, USB Type A.

    a. Standards: Comply with NEMA WD 1, UL 498 Supplement sd, UL 1310, and FS W-C-596.
    b. Marking: Labeled and complying with NFPA 70, "Health Care Facilities" Article, "Pediatric Locations" Section.

6. USB Receptacles: Dual, Type A.
7. Duplex GFCI Convenience Receptacles: 125 V, 20 A; NEMA WD 6, Configuration 5-20R; feed-through type with integral LED indicator light.

    a. Standards: Comply with NEMA WD 1, UL 498, UL 943 Class A, and FS W-C-596.

8. Hospital-Grade, Duplex GFCI Convenience Receptacles: 125 V, 20 A; NEMA WD 6, Configuration 5-20R; feed-through type with integral LED indicator light.

    a. Standards: Comply with NEMA WD 1, UL 498 Supplement sd, UL 943 Class A, and FS W-C-596.

9. Duplex SPD Convenience Receptacles: 125 V, 20 A; NEMA WD 6, Configuration 5-20R; with LED indicator light and integral SPD in line to ground, line to neutral, and neutral to ground.

    a. Standards: Comply with NEMA WD 1, UL 498, UL 1449, and FS W-C-596.

10. Isolated-Ground, Duplex SPD Convenience Receptacles: 125 V, 20 A; NEMA WD 6, Configuration 5-20R; with LED indicator light and integral SPD in line to ground, line to neutral, and neutral to ground.

    a. Standards: Comply with NEMA WD 1, UL 498, UL 1449, and FS W-C-596.

11. Hospital-Grade, Duplex SPD Convenience Receptacles: 125 V, 20 A; NEMA WD 6, Configuration 5-20R; with integral SPD in line to ground, line to neutral, and neutral to ground.

    a. Standards: Comply with NEMA WD 1, UL 498 Supplement sd, UL 1449, and FS W-C-596.

12. Isolated-Ground, Hospital-Grade, Duplex SPD Convenience Receptacles: 125 V, 20 A; NEMA WD 6, Configuration 5-20R; with integral SPD in line to ground, line to neutral, and neutral to ground.

    a. Standards: Comply with NEMA WD 1, UL 498 Supplement sd, UL 1449, and FS W-C-596.

13. Color of Receptacles: Ivory unless otherwise indicated or required by NFPA 70.

D. Switches:

1. Single-Pole Switches: 120/277 V, 20 A.

    a. Standards: Comply with NEMA WD 1, UL 20, and FS W-S-896.

2. Two-Pole Switches: 120/277 V, 20 A.

    a. Comply with NEMA WD 1, UL 20, and FS W-S-896.

3. Pilot-Light Switches, Single Pole: 120/277 V, 20 A, with LED-lighted handle, illuminated when switch is off.

    a. Standards: Comply with NEMA WD 1, UL 20, and FS W-S-896.

4. Key-Operated Switches: 120/277 V, 20 A; single pole, with factory-supplied key in lieu of switch handle.

    a. Standards: Comply with NEMA WD 1, UL 20, and FS W-S-896.

5. Color of Switches: Ivory unless otherwise indicated or required by NFPA 70.

E. Data Communication Outlets: Two RJ-45 jacks for terminating 100-ohm, balanced, four-pair twisted-pair cabling complying with TIA-568-C.1; complying with Category 6. Comply with UL 1863.

F. Cover Plates: Provide satin-finish, Type 304, stainless steel cover plates with formed, beveled edges.

G. Cover-Plate Identification: Use 1/4-inch- high letters unless otherwise indicated. For stainless steel or chrome-plated metal, stamp or etch plate and fill in letters with black enamel.

1. Provide at every cover plate.

    a. Receptacles other than standard 125-V duplex, grounding type.
    b. Switches and thermal-overload switches.

c. Pilot lights when located remotely from associated equipment or switch, where function is not obvious.
d. Receptacles, switches, and other locations indicated.

2. Provide the following information:

a. Voltage and phase for receptacles other than standard 125-V duplex, grounding type.
b. Indicate equipment being controlled by switches and thermal-overload switches.
c. Indicate equipment being controlled for pilot lights when located remotely from associated equipment or switch, where function is not obvious.
d. Number of the breaker in panelboard that controls device.

H. Pedestal-Type Fittings: Cast-aluminum housings with sloped single face or two faces, as indicated, with neoprene gasket under base and with concealed mounting holes in base for attaching to laboratory casework. Provide holes tapped for conduits.

I. Line-Type Fittings: Provide with cast-metal boxes with threaded holes for mounting on rigid steel conduit. Provide cover plates same size as boxes.

J. Recessed-Type Fittings: Provide with galvanized-steel boxes.

K. Finishes for Service-Fitting Components: Provide housings or boxes for pedestal- and line-type fittings with manufacturer's standard baked-on, chemical-resistant enamel in color as selected by Engineer from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of reinforcements, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF CABINETS

A. Comply with installation requirements in SEFA 2. Install level, plumb, and true in line; shim as required using concealed shims. Where laboratory casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical. Do not exceed the following tolerances:

1. Variation of Tops of Base Cabinets from Level: 1/16 inch in 10 feet.
2. Variation of Bottoms of Upper Cabinets from Level: 1/8 inch in 10 feet.
3. Variation of Faces of Casework from a True Plane: 1/8 inch in 10 feet.
4. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch.
5. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch.

B. Utility-Space Framing: Secure to floor with two fasteners at each frame. Fasten to partition framing, wood blocking, or metal reinforcements in partitions and to base cabinets.

C. Base Cabinets: Fasten cabinets to utility-space framing, partition framing, wood blocking, or reinforcements in partitions, with fasteners spaced not more than 16 inches o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform.

1. Where base cabinets are installed away from walls, fasten to floor at toe space at not more than 24 inches o.c. and at sides of cabinets with not less than two fasteners per side.

D. Wall Cabinets: Fasten to hanging strips, masonry, partition framing, blocking, or reinforcements in partitions. Fasten each cabinet through back, near top, at not less than 16 inches o.c.

E. Install hardware uniformly and precisely.

F. Adjust operating hardware so doors and drawers align and operate smoothly without warp or bind and contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.

3.3 INSTALLATION OF COUNTERTOPS

A. Comply with installation requirements in SEFA 2. Abut top and edge surfaces true in plane with flush hairline joints and with internal supports placed to prevent deflection. Locate joints where indicated on Shop Drawings.

B. Field Jointing: Where possible, make in same manner as shop-made joints, using dowels, splines, fasteners, adhesives, and sealants recommended by manufacturer. Shop prepare edges for field-made joints.

C. Fastening:

1. Secure countertops, except for epoxy countertops, to cabinets with Z-type fasteners or equivalent, using two or more fasteners at each cabinet front, end, and back.
2. Secure epoxy countertops to cabinets with epoxy cement, applied at each corner and along perimeter edges at not more than 48 inches o.c.
3. Where necessary to penetrate countertops with fasteners, countersink heads approximately 1/8 inch and plug hole flush with material equal to countertop in chemical resistance, hardness, and appearance.

D. Provide holes and cutouts required for service fittings.

E. Provide scribe moldings for closures at junctures of countertop, curb, and splash with walls as recommended by manufacturer for materials involved. Match materials and finish to adjacent laboratory casework. Use chemical-resistant, permanently elastic sealing compound where recommended by manufacturer.

F. Dress joints smooth, remove surface scratches, and clean entire surface.

3.4 INSTALLATION OF SINKS

A. Comply with installation requirements in SEFA 2.

B. Underside Installation of Epoxy Sinks: Use laboratory casework manufacturer's recommended adjustable support system for table- and cabinet-type installations. Set top edge of sink unit in sink and countertop manufacturers' recommended chemical-resistant sealing compound or adhesive, and firmly secure to produce a tight and fully leakproof joint. Adjust sink and securely support to prevent movement. Remove excess sealant or adhesive while still wet and finish joint for neat appearance.

C. Drop-in Installation of Epoxy Cup Sinks: Rout groove in countertop to receive sink rim if not shop prepared. Set sink in adhesive and fill remainder of groove with sealant or adhesive. Use procedures and products recommended by sink and countertop manufacturers. Remove excess adhesive and sealant while still wet and finish joint for neat appearance.

3.5 INSTALLATION OF LABORATORY CASEWORK ACCESSORIES

A. Install accessories in accordance with Shop Drawings, installation requirements in SEFA 2, and manufacturer's written instructions.

B. Securely fasten adjustable shelving supports, stainless steel shelves, and pegboards to partition framing, wood blocking, or reinforcements in partitions.

C. Install shelf standards plumb and at heights to align shelf brackets for level shelves. Install shelving level and straight, closely fitted to other work where indicated.

3.6 INSTALLATION OF SERVICE FITTINGS

A. Comply with requirements in other Sections for installing water and laboratory gas service fittings and electrical devices.

B. Install fittings in accordance with Shop Drawings, installation requirements in SEFA 2, and manufacturer's written instructions. Set bases and flanges of sink- and countertop-mounted fittings in sealant recommended by manufacturer of sink or countertop material. Securely anchor fittings to laboratory casework unless otherwise indicated.

3.7 CLEANING AND PROTECTING

A. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Engineer.

B. Protect countertop surfaces during construction with 6-mil plastic or other suitable water-resistant covering. Tape to underside of countertop at a minimum of 48 inches o.c.

3.8 SERVICE-FITTING SCHEDULE

A. Water Service Fitting, Type WF-1:

1. Fitting Type: Swing-spout gooseneck mixing faucet with wrist blade handles.
2. Outlet: Vacuum breaker and removable serrated outlet.
3. Mounting: Deck mounted.
4. Basis of Design Model: WaterSaver L412VB-BH.
5. Location: At laboratory sinks.

B. Water Service Fitting, Type WS-2:

1. Fitting Type: Rigid, gooseneck with wrist blade handle.
2. Outlet: Vacuum breaker and serrated outlet.
3. Mounting: Deck mounted (right- and left-hand configurations).
4. Basis of Design Model: WaterSaver L611VB-BH.
5. Location: At cup sinks

C. Laboratory Gas Service Fitting, Type GF-1:

1. Service: Vacuum.
2. Fitting Type: Turret.
3. Outlets: One.
4. Outlet Type: Straight.
5. Valve Type: Needle valve.
6. Basis of Design Model: WaterSaver Colortech CT5180FT-325.

D. Laboratory Gas Service Fitting, Type GF-2:

1. Service: Carbon Dioxide.
2. Fitting Type: Turret.
3. Outlets: Two at 90 degrees.
4. Outlet Type: Straight.
5. Valve Type: Needle valve.
6. Basis of Design Model: WaterSaver Colortech CT3180-141FT.

E. Laboratory Gas Service Fitting, Type GF-3:

1. Service: Vacuum.
2. Fitting Type: Flange Type.
3. Outlets: One.
4. Outlet Type: Straight.
5. Valve Type: Needle valve.
6. Basis of Design Model: WaterSaver Colortech CT5180F-225WSA.

F. Laboratory Gas Service Fitting, Type GF-4:

1. Service: Argon.
2. Fitting Type: Turret, integral to mobility tables MB-1 and MB-2.
3. Outlets: One.
4. Outlet Type: Straight.

5. Valve Type: Needle valve.
6. Basis of Design Model: WaterSaver Colortech CT2880.

G. Laboratory Gas Service Fitting, Type GF-5:

1. Service: 95 percent Argon and 5 percent Hydrogen mixture.
2. Fitting Type: Turret, integral to mobility table MB-1.
3. Outlets: One.
4. Outlet Type: Straight.
5. Valve Type: Needle valve.
6. Basis of Design Model: WaterSaver Colortech CT2880.

H. Laboratory Gas Service Fitting, Type GF-6:

1. Service: Acetylene.
2. Fitting Type: Turret, integral to mobility table MB-2.
3. Outlets: One.
4. Outlet Type: Straight.
5. Valve Type: Needle valve.
6. Basis of Design Model: WaterSaver Colortech CT2880.

I. Laboratory Gas Service Fitting, Type GF-7:

1. Service: Nitrous Oxide.
2. Fitting Type: Turret, integral to mobility table MB-2.
3. Outlets: One.
4. Outlet Type: Straight.
5. Valve Type: Needle valve.
6. Basis of Design Model: WaterSaver Colortech CT2880.

J. Electrical Service Fitting, Type EF-1:

1. Fitting Type: Recessed.
2. Device: One duplex receptacle.

K. Electrical Service Fitting, Type EF-2:

1. Fitting Type: Recessed.
2. Device: Two duplex receptacles.

L. Electrical Service Fitting, Type EF-3:

1. Fitting Type: Recessed.
2. Device: One switched receptacle.

M. Electrical Service Fitting, Type EF-4:

1. Fitting Type: Recessed.
2. Device: 120V, single phase, 30A.

N. Electrical Service Fitting, Type EF-5:

1. Fitting Type: Recessed.
2. Device: 208V, single phase, 30A.

3.9 LABORATORY SINK SCHEDULE

A. Laboratory Sink: Type SK-1:

1. Basis of Design: Durcon U51.
2. Epoxy undermount.
3. 24 inches L x 16 inches W x 10 inches D.

B. Laboratory Sink: Type SK-2:

1. Basis of Design: Durcon U30U-CR.
2. Epoxy undermount, double bowl.
3. 15 inches L x 18 inches W x 11 inches D.

C. Laboratory Sink: Type SK-3:

1. Basis of Design: Durcon U24C.
2. Epoxy undermount.
3. 18 inches L x 14 inches W x 10.5 inches D.

3.10 LABORATORY ACCESSORY SCHEDULE

A. Pegboard: Type PB-1:

1. Basis of Design: Mott Manufacturing SPB2430.
2. Stainless steel with 4-inch-deep trough.
3. 24 inches W x 30 inches H.

B. Combination Towel (Folded) Dispenser/Waste Receptacle R-1:

1. Basis of Design: Bobrick Model B-3699.
2. Description: Combination unit for dispensing C-fold or multifold towels with removable waste receptacle.
3. Mounting: Surface mounted.
4. Minimum Towel-Dispenser Capacity: 350 C-fold or 475 multifold paper towels.
5. Minimum Waste Receptacle Capacity: 2 gal.
6. Material and Finish: Stainless steel, ASTM A480/A480M, No. 4 finish (satin).

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SECTION 123661.16 - SOLID SURFACING COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Solid surface material countertops.
2. Solid surface material backsplashes.
3. Solid surface material end splashes.
4. Stainless-steel countertops.
5. Section includes stone countertops.

B. Related Requirements:

1. Section 079200 "Joint Sealants" for joint sealants.

1.3 ACTION SUBMITTALS

A. Product Data: For countertop materials.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

1. Show locations and details of joints.
2. Show direction of directional pattern, if any.
3. For countertops, show locations and sizes of cutouts and holes for items installed in metal countertops.

C. Samples for Initial Selection: For each type of material exposed to view.

D. Samples for Verification: For the following products:

1. Countertop material, 6 inches square.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver products only after casework and supports on which they will be installed has been completed in installation areas.

B. Keep finished surfaces of products covered with polyethylene film or other protective covering during handling and installation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of countertops.

C. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.

1. Build mockup of typical countertop as shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.9 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

A. Basis-of-Design Product: Subject to compliance with requirements, provide LG Hausys, Ltd.; Hi-Macs Series, Classic Collection or a comparable product by one of the following:

1. DuPont; DuPont de Nemours, Inc.
2. Wilsonart LLC.
3. PSA Laboratory Furniture LLC.

B. Countertops: Provide front and end overhang of 1 inch over the base cabinets.

C. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.

1. Type: Provide Standard type unless Special Purpose type is indicated.
2. Colors and Patterns: As indicated by manufacturer's designations As selected by Engineer from manufacturer's full range.

2.2 SOLID SURFACE COUNTERTOP FABRICATION

A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Grade: Custom.

B. Configuration:

1. Front: Straight, slightly eased at top.
2. Backsplash: Radius edge with 3/8-inch radius.
3. End Splash: Matching backsplash.

C. Countertops: 1/2-inch- thick, solid surface material with front edge built up with same material.

D. Backsplashes: 1/2-inch- thick, solid surface material.

E. Fabricate tops with shop-applied edges unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

1. Fabricate with loose backsplashes for field assembly.

F. Joints: Fabricate countertops in sections for joining in field, with joints at locations indicated on Shop Drawings.

1. Minimize number of joints by fabricating countertops in longest possible lengths according to industry standards and for ease of product handling.
2. Joint Locations: Not within 18 inches of a sink or cooktop and not where a countertop section less than 36 inches long would result, unless unavoidable.
3. Splined Joints: Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints. Make width of cuts slightly more than thickness of splines to provide snug fit. Provide at least three splines in each joint.

G. Cutouts and Holes:

1. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.

2. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

H. Adhesive: Product recommended by solid surface material manufacturer.

I. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

1. Mildew-resistant silicone sealant, clear.

2.3 STAINLESS-STEEL COUNTERTOP FABRICATIONS

A. Countertops: Fabricate from 0.062-inch- thick, stainless-steel sheet. Provide smooth, clean exposed tops and edges in uniform plane, free of defects. Provide front and end overhang of 1 inch over the base cabinets.

1. Joints: Fabricate countertops without field-made joints.
2. Weld shop-made joints.
3. Material: Stainless steel sheet T304.
4. Finish: Satin Finish No. 4
5. L-shaped, Countertops and Sinks are designed to accommodate the construction plans.
6. Provide fixture holes at sinks; indicate locations in shop drawings.
7. Sound deaden the undersurface with heavy-build mastic coating.
8. Extend the top down to provide a 1-inch- thick edge with a 1/2-inch return flange.
9. Form the backsplash coved to and integral with top surface, with a 1/2-inch- thick top edge and 1/2-inch return flange.

2.4 STAINLESS-STEEL COUNTERTOP MATERIALS

A. Stainless-Steel Sheet: ASTM A240/A240M, Type 304.

B. Sealant for Countertops: Manufacturer's standard sealant that complies with applicable requirements in Section 079200 "Joint Sealants" and the following:

1. Mildew-Resistant Joint Sealant
2. Joint Sealant: Latex Single component, nonsag, neutral curing, silicone; Class 25.
3. Color: Clear.

2.5 STAINLESS-STEEL FINISH

A. Grind and polish surfaces to produce uniform, directional satin finish matching No. 4 finish, with no evidence of welds and free of cross scratches. Run grain with long dimension of each piece. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces clean.

2.6 GRANITE COUNTERTOPS

A. Material Standard: Comply with ASTM C615/C615M.

B. Cut stone from contiguous, matched slabs in which natural markings occur.

C. Finish: Polished.

D. Match existing granite counter for color, finish, and other stone characteristics relating to aesthetic effects.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of stone countertops.

3.2 CONSTRUCTION TOLERANCES STONE COUNTERTOPS

A. Variation from Level: Do not exceed 1/8 inch in 96 inches, 1/4 inch maximum.

B. Variation in Joint Width: Do not vary joint thickness more than one-fourth of nominal joint width.

C. Variation in Plane at Joints (Lipping): Do not exceed 1/64-inch difference between planes of adjacent units.

D. Variation in Line of Edge at Joints (Lipping): Do not exceed 1/64-inch difference between edges of adjacent units, where edge line continues across joint.

3.3 INSTALLATION SOLID SURFACE COUNTERTOP

A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.

B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

C. Fasten subtops to cabinets by screwing through subtops into corner blocks of base cabinets. Shim as needed to align subtops in a level plane.

D. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.

1. Install metal splines in kerfs in countertop edges at joints. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.

F. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.

G. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.

H. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

1. Seal edges of cutouts in particleboard subtops by saturating with varnish.

I. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

3.4 INSTALLATION STAINLESS-STEEL COUNTERTOP

A. Install metal countertops level, plumb, and true; shim as required, using concealed shims.

B. Field Jointing: Where possible, make field jointing in the same manner as shop jointing; use fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.

C. Secure countertops to cabinets with Z- or L-type fasteners or equivalent; use two or more fasteners at each front, end, and back.

D. Abut top and edge surfaces in one true plane, with internal supports placed to prevent deflection.

E. Seal junctures of countertops, splashes, and walls with sealant for countertops.

F. Wall-Mounted Shelves: Fasten to supporting construction through upturned back edge at not less than 24 inches o.c.

1. For framed construction, fasten through wall or partition finishes directly to framing, blocking, or reinforcements.

3.5 INSTALLATION OF STONE COUNTERTOPS

A. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.

B. Install countertops over subtops with full spread of water-cleanable epoxy adhesive.

C. Do not cut stone in field unless otherwise indicated. If stone countertops or splashes require additional fabrication not specified to be performed at Project site, return to fabrication shop for adjustment.

D. Set stone to comply with requirements indicated. Shim and adjust stone to locations indicated, with uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances. Install anchors and other attachments indicated or necessary to secure stone countertops in place.

E. Bond joints with stone adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.

1. Install metal splines in kerfs in stone edges at joints. Fill kerfs with stone adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.

F. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Use power saws with diamond blades to cut stone. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

G. Install backsplashes and end splashes by adhering to wall with water-cleanable epoxy adhesive. Leave 1/16-inch gap between countertop and splashes for filling with sealant. Use temporary shims to ensure uniform spacing.

H. Grout joints to comply with ANSI A108.10. Remove temporary shims before grouting. Tool grout uniformly and smoothly with plastic tool.

I. Apply sealant to joints and gaps specified for filling with sealant; comply with Section 079200 "Joint Sealants." Remove temporary shims before applying sealant.

3.6 CLEANING AND PROTECTION

A. Repair or remove and replace defective work as directed on completion of installation.

B. Clean finished surfaces. Remove and replace damaged products or touch up and refinish damaged areas to match original factory finish, as approved by Engineer.

C. Protection: Provide 6-mil plastic or other suitable water-resistant covering over countertop surfaces. Tape to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

D. In-Progress Cleaning: Clean stone countertops as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately.

E. Remove and replace stone countertops of the following description:

1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Engineer.
2. Defective countertops.
3. Defective joints, including misaligned joints.
4. Interior stone countertops and joints not matching approved Samples and mockups.
5. Interior stone countertops not complying with other requirements indicated.

F. Replace in a manner that results in stone countertops matching approved Samples and mockups, complying with other requirements, and showing no evidence of replacement.

G. Clean stone countertops no fewer than six days after completion of sealant installation, using clean water and soft rags. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that may damage stone.

H. Sealer Application stone countertop: Apply stone sealer to comply with stone producer's and sealer manufacturer's written instructions.

END OF SECTION 123661.16

Division 21

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SECTION 210517 - SLEEVES AND SLEEVE SEALS FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sleeves.
2. Stack-sleeve fittings.
3. Sleeve-seal systems.
4. Sleeve-seal fittings.
5. Grout.
6. Silicone sealants.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Pipe Sleeves: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop.

B. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, anticorrosion coated or galvanized, with plain ends and integral welded waterstop collar.

C. Galvanized-Steel Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

2.2 STACK-SLEEVE FITTINGS

A. Description: Manufactured, Dura-coated or Duco-coated or galvanized cast-iron sleeve with integral clamping flange for use in waterproof floors and roofs. Include clamping ring, bolts, and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL SYSTEMS

A. Description:

1. Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
2. Designed to form a hydrostatic seal of 20 psig minimum.
3. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size.
4. Pressure Plates: Carbon steel or Composite plastic.
5. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, ASTM B 633 of length required to secure pressure plates to sealing elements.

2.4 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall.

B. Plastic or rubber waterstop collar with center opening to match piping OD.

2.5 GROUT

A. Description: Nonshrink, for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.6 SILICONE SEALANTS

A. Silicone, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant, ASTM C 920, Type S, Grade NS, Class 25, Use NT.

B. Silicone, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant;

ASTM C 920, Type S, Grade P, Class 25, Uses T and NT. Grade P Pourable (self-leveling) formulation is for opening in floors and other horizontal surfaces that are not fire rated.

C. Silicone Foam: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

2. Using grout or silicone sealant, seal space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint.

E. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping and fill materials specified in Section 078413 "Penetration Firestopping."

3.2 STACK-SLEEVE-FITTING INSTALLATION

A. Install stack-sleeve fittings in new slabs as slabs are constructed.

1. Install fittings that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.

2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Section 076200 "Sheet Metal Flashing and Trim."
3. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
5. Use silicone sealant to seal around the outside of stack-sleeve fittings.

B. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke rating of floors at pipe penetrations. Seal pipe penetrations with fire- or smoke-stop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.4 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Use grout or silicone sealant, to seal the space around outside of sleeve-seal fittings.

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Leak Test: After allowing for a full cure, test sleeves and sleeve seals for leaks. Repair leaks and retest until no leaks exist.

B. Sleeves and sleeve seals will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.6 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade:

   a. Piping Smaller Than NPS 6: Cast-iron pipe sleeves Steel pipe sleeves.
   b. Piping NPS 6 and Larger: Cast-iron pipe sleeves Steel pipe sleeves.

2. Exterior Concrete Walls below Grade:

   a. Piping Smaller Than NPS 6: Cast-iron pipe sleeves with sleeve-seal system Steel pipe sleeves with sleeve-seal system.

      1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

   b. Piping NPS 6 and Larger: Cast-iron pipe sleeves with sleeve-seal system Steel pipe sleeves with sleeve-seal system.

      1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Concrete Slabs-on-Grade:

   a. Piping Smaller Than NPS 6: Cast-iron pipe sleeves with sleeve-seal system Galvanized steel pipe sleeves with sleeve-seal system.

      1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

   b. Piping NPS 6 and Larger: Cast-iron pipe sleeves with sleeve-seal system Galvanized steel pipe sleeves with sleeve-seal system.

      1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

4. Concrete Slabs above Grade:

   a. Piping Smaller Than NPS 6: Steel pipe sleeves PVC pipe sleeves Molded-PVC sleeves.
   b. Piping NPS 6 and Larger: Steel pipe sleeves PVC pipe sleeves.

5. Interior Partitions:

   a. Piping Smaller Than NPS 6: Steel pipe sleeves PVC pipe sleeves.
   b. Piping NPS 6 and Larger: Galvanized-steel sheet sleeves.

END OF SECTION 210517

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SECTION 210518 - ESCUTCHEONS FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Escutcheons.
2. Floor plates.

1.3 DEFINITIONS

A. Existing Piping to Remain: Existing piping that is not to be removed and that is not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. One-Piece, Steel Type: With polished, chrome-plated finish and setscrew fastener.

B. One-Piece, Stainless Steel Type: With polished stainless steel finish.

C. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.

D. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped steel with polished, chrome-plated finish and spring-clip fasteners.

E. One-Piece, Stamped-Steel Type: With polished, chrome-plated finish and spring-clip fasteners.

F. Split-Plate, Stamped-Steel Type: With polished, chrome-plated finish; concealed and exposed-rivet hinge; and spring-clip fasteners.

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2.2 FLOOR PLATES

A. Split Floor Plates: Steel with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. Escutcheons for New Piping and Relocated Existing Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep pattern.
b. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece steel with polished, chrome-plated finish.
c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece stainless steel with polished stainless steel finish.
d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece steel with polished, chrome-plated finish.
e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece stainless steel with polished stainless steel finish.
f. Bare Piping in Unfinished Service Spaces: One-piece steel with polished, chrome-plated finish.
g. Bare Piping in Unfinished Service Spaces: One-piece stamped steel or split-plate, stamped steel with concealed hinge or split-plate, stamped steel with exposed-rivet hinge with polished, chrome-plated finish.
h. Bare Piping in Equipment Rooms: One-piece steel with polished, chrome-plated finish.
i. Bare Piping in Equipment Rooms: One-piece stamped steel or split-plate, stamped steel with concealed hinge or split-plate, stamped steel with exposed-rivet hinge with polished, chrome-plated finish.

2. Escutcheons for Existing Piping to Remain:

a. Chrome-Plated Piping: Split-plate, stamped steel with concealed or exposed-rivet hinge with polished, chrome-plated finish.
b. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-plate, stamped steel with concealed or exposed-rivet hinge with polished, chrome-plated finish.
c. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-plate, stamped steel with concealed or exposed-rivet hinge with polished, chrome-plated finish.
d. Bare Piping in Unfinished Service Spaces: Split-plate, stamped steel with concealed or exposed-rivet hinge with polished, chrome-plated finish.
e. Bare Piping in Equipment Rooms: Split-plate, stamped steel with concealed or exposed-rivet hinge with polished, chrome-plated finish.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping and Relocated Existing Piping: One-piece, floor plate.
2. Existing Piping: Split floor plate.

3.2 FIELD QUALITY CONTROL

A. Using new materials, replace broken and damaged escutcheons and floor plates.

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SECTION 210529 - HANGERS AND SUPPORTS FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Fastener systems.
5. Equipment supports.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Equipment supports.

C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of trapeze hangers.
2. Include design calculations for designing trapeze hangers.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

A. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.

B. Pipe Welding Qualifications: Qualify procedures and operators according to 2015 ASME Boiler and Pressure Vessel Code, Section IX.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design trapeze pipe hangers and equipment supports.

B. Structural Performance: Ensure hangers and supports for fire-suppression piping and equipment withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

C. NFPA Compliance: Comply with NFPA 13.

D. UL Compliance: Comply with UL 203.

2.2 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: Factory-fabricated components, NFPA approved, UL listed, or FM approved for fire-suppression piping support.
2. Galvanized Metallic Coatings: Pregalvanized or hot-dip galvanized.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel or stainless steel.

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly, made from structural-carbon-steel shapes, with NFPA-approved, UL-listed, or FM-approved carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.4 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Description: Shop- or field-fabricated pipe-support assembly, made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
2. Standard: Comply with MFMA-4, factory-fabricated components for field assembly.
3. Channels: Continuous slotted carbon-steel channel with inturned lips.
4. Channel Width: Selected for applicable load criteria.
5. Channel Nuts: Formed or stamped nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
7. Metallic Coating: Pregalvanized G90 Electroplated zinc Hot-dip galvanized.
8. Paint Coating: Green epoxy, acrylic, or urethane.

B. Non-MFMA Manufacturer Metal Framing Systems:

1. Description: Shop- or field-fabricated pipe-support assembly, made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
2. Standard: Comply with MFMA-4, factory-fabricated components for field assembly.
3. Channels: Continuous slotted carbon-steel channel with inturned lips.
4. Channel Width: Select for applicable load criteria.
5. Channel Nuts: Formed or stamped nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
7. Metallic Coating: Pregalvanized G90 Hot-dip galvanized.
8. Paint Coating: Green epoxy, acrylic, or urethane.

2.5 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: NFPA-approved, UL-listed, or FM-approved threaded-steel stud, for use in hardened Portland cement concrete, with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: NFPA-approved, UL-listed, or FM-approved, insert-wedge-type anchors, for use in hardened Portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Indoor Applications: Zinc-coated or Stainless steel.
2. Outdoor Applications: Stainless steel.

2.6 EQUIPMENT SUPPORTS

A. Description: NFPA-approved, UL-listed, or FM-approved, welded, shop- or field-fabricated equipment support, made from structural-carbon-steel shapes.

2.7 MATERIALS

A. Aluminum: ASTM B 221.

B. Carbon Steel: ASTM A 1011/A 1011M.

C. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

D. Stainless Steel: ASTM A 240/A 240M.

E. Grout: ASTM C 1107/C 1107M, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout, suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation, for penetrations through fire-rated walls, ceilings, and assemblies.

B. Strength of Support Assemblies: Where not indicated, select sizes of components, so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination is weight of supported components (water-filled piping) plus 250 lb.

3.2 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with installation requirements of approvals and listings. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size, or install intermediate supports for smaller-diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal strut systems.

D. Thermal Hanger-Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete, after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual. Install in accordance with approvals and listings.
2. Install mechanical-expansion anchors in concrete, after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions. Install in accordance with approvals and listings.

F. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

I. Install lateral bracing with pipe hangers and supports to prevent swaying.

J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

K. Load Distribution: Install hangers and supports, so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections, so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.6 PAINTING

A. Touchup: Clean field welds and abraded, shop-painted areas. Paint exposed areas immediately after erecting hangers and supports. Use same materials as those used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded, shop-painted areas on miscellaneous metal are specified in Section 099113 "Exterior Painting." Section 099123 "Interior Painting." Section 099600 "High-Performance Coatings."

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas, and apply galvanizing-repair paint to comply with ASTM A 780/A 780M.

3.7 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with NFPA requirements for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finishes.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports metal trapeze pipe hangers and metal framing systems and attachments for general service applications.

F. Use stainless steel pipe hangers and stainless steel or corrosion-resistant attachments for hostile environment applications.

G. Horizontal-Piping Hangers and Supports: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Steel Pipe Clamps (MSS Type 4): For suspension of NPS 1/2 to NPS 24 if little or no insulation is required.
3. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
4. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
5. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
6. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
7. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
8. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
9. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.

H. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

I. Hanger-Rod Attachments: Comply with NFPA requirements.

J. Building Attachments: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable-Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. C-Clamps (MSS Type 23): For structural shapes.
3. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.

K. Saddles and Shields: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.

3. Thermal Hanger-Shield Inserts: For supporting insulated pipe.

L. Comply with NFPA requirements for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

M. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

N. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 210529

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SECTION 210553 - IDENTIFICATION FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Valve tags.
5. Warning tags.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment-Label Schedule: Include a listing of all equipment to be labeled and the proposed content for each label.

D. Valve Schedules: Valve numbering scheme.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: stainless steel, 0.025 inch or anodized aluminum, 0.032 inch thick, with predrilled holes for attachment hardware.
2. Letter Color: Black Red.
3. Background Color: White.
4. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
5. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering

for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

6. Fasteners: Stainless steel rivets or self-tapping screws.
7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, with predrilled holes for attachment hardware.
2. Letter Color: Black Red.
3. Background Color: White.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless steel rivets or self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

D. Equipment-Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, with predrilled holes for attachment hardware.

B. Letter Color: Red White.

C. Background Color: Red White.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service and showing flow direction according to ASME A13.1.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe-Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions; or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1/2 inch for viewing distances up to 72 inches and proportionately larger lettering for greater viewing distances.

E. Pipe-Label Colors:

1. Background Color: Safety Red.
2. Letter Color: White.

2.4 VALVE TAGS

A. Description: Stamped or engraved with 1/4-inch letters for piping-system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032 inch stainless steel, 0.025 inch or anodized aluminum, 0.032 inch thick, with predrilled holes for attachment hardware.
2. Fasteners: Brass wire-link chain beaded chain.
3. Valve-Tag Color: Safety Red.
4. Letter Color: White.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule included in operation and maintenance data.

2.5 WARNING TAGS

A. Description: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.

1. Size: Approximately 4 by 7 inches.
2. Fasteners: Brass grommet and wire.
3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Safety Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of incompatible primers, paints, and encapsulants, as well as dirt, oil, grease, release agents, and other substances that could impair bond of identification devices.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be installed.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

A. Piping: Painting of piping is specified in Section 099123 "Interior Painting." Section 099600 "High-Performance Coatings."

B. Pipe-Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection excluding short takeoffs. Where flow pattern is not obvious, mark each pipe at branch.

3. Near penetrations and on both sides of through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit a view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

C. Directional Flow Arrows: Use arrows to indicate direction of flow in pipes including pipes where flow is allowed in both directions.

3.5 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in fire-suppression piping systems. List tagged valves in a valve-tag schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and with captions similar to those indicated in "Valve-Tag Size and Shape" Subparagraph below:

1. Valve-Tag Size and Shape:

a. Wet-Pipe Sprinkler System: 2 inches, round.

3.6 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 210553

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SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipes, fittings, and specialties.
2. Specialty valves.
3. Sprinklers.
4. Alarm devices.
5. Pressure gages.
6. Delegated Design.

B. Related Requirements:

1.3 DEFINITIONS

A. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175-psig maximum.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For wet-pipe sprinkler systems.

1. Include plans, elevations, sections, and attachment details.

1.5 DELEGATED DESIGN SUBMITTALS

A. For wet-pipe sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Domestic water piping.
2. Compressed air piping.
3. HVAC hydronic piping.
4. Items penetrating finished ceiling include the following:

    a. Lighting fixtures.
    b. Air outlets and inlets.

B. Qualification Data: For qualified Installer.

C. Design Data:

1. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations for expanded and existing areas as indicated on the supplied plans.

D. Welding certificates.

E. Field Test Reports:

1. Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
2. Fire-hydrant flow test report.

F. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wet-pipe sprinkler systems and specialties to include in emergency, operation, and maintenance manuals.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

1.9 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.

a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.

B. Welding Qualifications: Qualify procedures and operators according to 2010 ASME Boiler and Pressure Vessel Code.

1.10 FIELD CONDITIONS

A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:

1. Notify Engineer and Owner no fewer than two days in advance of proposed interruption of sprinkler service.
2. Do not proceed with interruption of sprinkler service without Engineer's and Owner's written permission.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Verify sprinkler system equipment, specialties, accessories, installation, and testing comply with the following:

1. NFPA 13.

B. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.

C. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design wet-pipe sprinkler systems.

1. Available fire-hydrant flow test records indicate the following conditions:

a. Date: 10/30/2024.
b. Time: 9:25 a.m.
c. Performed by: Robert Foye of Hedrick Fire Protection.
d. Location of Residual Fire Hydrant R: 1950 N Nevada Street, Redland, CA_ Gauge Hydrant.
e. Location of Flow Fire Hydrant F: 1950 N Nevada Street, Redland, CA_ Flow Hydrant.
f. Static Pressure at Residual Fire Hydrant R: 56 psi.

g. Measured Flow at Flow Fire Hydrant F: 1,456 gpm.
h. Residual Pressure at Residual Fire Hydrant R: 39.5 psi.
i. Device Used: Big Boy Hose Monster
j. Flow at 20 psi: 2,219.8 gpm

2. Ensure sprinkler system design approved by authorities having jurisdiction.

a. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
b. Sprinkler Occupancy Hazard Classifications:

1) Building Service Areas: Ordinary Hazard, Group 1.
2) Electrical Equipment Rooms: Ordinary Hazard, Group 1.
3) General Storage Areas: Ordinary Hazard, Group 1.
4) Library Stack Areas: Ordinary Hazard, Group 2.
5) Mechanical Equipment Rooms: Ordinary Hazard, Group 1.
6) Office and Public Areas: Light Hazard.
7) Lab Rooms: Ordinary Hazard, Group 1

3. Minimum Density for Automatic-Sprinkler Piping Design:

a. Laboratories: 0.15 gpm over 1,500-sq. ft.
b. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
c. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.
d. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500-sq. ft. area.

4. Maximum Protection Area per Sprinkler: NFPA 13 and UL listings.

a. Office Spaces: 225 sq. ft..
b. Storage Areas: 130 sq. ft..
c. Mechanical Equipment Rooms: 130 sq. ft..
d. Electrical Equipment Rooms: 130 sq. ft..
e. Laboratories: 130 sq. ft.

D. Seismic Performance: Ensure sprinkler piping withstands the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

2.2 STEEL PIPE AND FITTINGS

A. Standard-Weight, Galvanized- and Black-Steel Pipe: ASTM A53/A53M, Type E, Grade B. Pipe ends may be factory or field formed to match joining method.

B. Schedule 10, Black-Steel Pipe: ASTM A135/A135M or ASTM A795/A795M, Schedule 10 in NPS 2.5 and larger; and NFPA 13-specified wall thickness in NPS 6 to NPS 10, plain end.

C. Galvanized- and Black-Steel Pipe Nipples: ASTM A733, made of ASTM A53/A53M, standard-weight, seamless steel pipe with threaded ends.

D. Galvanized- and Uncoated-Steel Couplings: ASTM A865/A865M, threaded.

E. Galvanized and Uncoated, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.

F. Malleable- or Ductile-Iron Unions: UL 860.

G. Cast-Iron Flanges: ASME 16.1, Class 125.

H. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.

1. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic and asbestos free or EPDM rubber gasket.

a. Class 125 and Class 250, Cast-Iron, Flat-Face Flanges: Full-face gaskets.
b. Class 150 and Class 300, Ductile-Iron or -Steel, Raised-Face Flanges: Ring-type gaskets.

2. Metal, Pipe-Flange Bolts and Nuts: Carbon steel unless otherwise indicated.

I. Steel Welding Fittings: ASTM A234/A234M and ASME B16.9.

1. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

J. Grooved-Joint, Steel-Pipe Appurtenances:

1. Pressure Rating: 175-psig minimum.
2. Galvanized or Painted Grooved-End Fittings for Steel Piping: ASTM A47/A47M, malleable-iron casting or ASTM A536, ductile-iron casting, with dimensions matching steel pipe.
3. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213 rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

2.3 SPECIALTY VALVES

A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

B. Pressure Rating:

1. Standard-Pressure Piping Specialty Valves: 175-psig minimum.

C. Body Material: Cast or ductile iron.

D. Size: Same as connected piping.

E. End Connections: Flanged or grooved.

2.4 SPRINKLER PIPING SPECIALTIES

A. Branch Outlet Fittings:

1. Standard: UL 213.
2. Pressure Rating: 175-psig minimum.
3. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
4. Type: Mechanical-tee and -cross fittings.
5. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
6. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
7. Branch Outlets: Grooved, plain-end pipe, or threaded.

B. Branch Line Testers:

1. Standard: UL 199.
2. Pressure Rating: 175 psig.
3. Body Material: Brass.
4. Size: Same as connected piping.
5. Inlet: Threaded.
6. Drain Outlet: Threaded and capped.
7. Branch Outlet: Threaded, for sprinkler.

C. Adjustable Drop Nipples:

1. Standard: UL 1474.
2. Pressure Rating: 250-psig minimum.
3. Body Material: Steel pipe with EPDM-rubber O-ring seals.
4. Size: Same as connected piping.
5. Length: Adjustable.
6. Inlet and Outlet: Threaded.

D. Flexible Sprinkler Hose Fittings:

1. Standard: UL 2443.
2. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
3. Pressure Rating: 175-psig minimum.
4. Size: Same as connected piping, for sprinkler.

2.5 SPRINKLERS

A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

B. Pressure Rating for Automatic Sprinklers: 175-psig minimum.

C. Automatic Sprinklers with Heat-Responsive Element:

1. Nonresidential Applications: UL 199.
2. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

D. Sprinkler Finishes: Chrome plated.

E. Special Coatings: Wax, PTFE, or corrosion-resistant factory coating.

F. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

1. Ceiling Mounting: Chrome-plated steel, one piece, flat Chrome-plated steel, two piece, with 1-inch vertical adjustment Plastic, chrome-plated or white finish, one piece, flat.
2. Sidewall Mounting: Chrome-plated steel or Plastic, white finish, one piece, flat.

G. Sprinkler Guards:

1. Standard: UL 199.
2. Type: Wire cage with fastening device for attaching to sprinkler.

H. Valve Supervisory Switches:

1. Standard: UL 346.
2. Type: Electrically supervised.
3. Components: Single-pole, double-throw switch with normally closed contacts.
4. Design: Signals that controlled valve is in other than fully open position.
5. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.6 PRESSURE GAGES

A. Standard: UL 393.

B. Dial Size: 3-1/2- to 4-1/2-inch diameter.

C. Pressure Gage Range: 0 to 300 psig.

D. Label: Include "WATER" label on dial face.

PART 3 - EXECUTION

3.1 WATER-SUPPLY CONNECTIONS

A. Connect sprinkler piping to building's interior water-distribution piping. Comply with requirements for interior piping in Section 221116 "Domestic Water Piping."

B. Replace the existing backflow and install a new device per local code requirements and as indicated on the supplied plans (Watts 774DCDA) together with tamper switches, and other required accessories in water-distribution piping.

3.2 PIPING INSTALLATION

A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.

1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Engineer before deviating from approved working plans.
2. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

B. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.

C. Install seismic restraints on piping. Comply with NFPA 13 requirements for seismic-restraint device materials and installation.

D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

E. Install unions adjacent to each valve in pipes NPS 2 and smaller.

F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

G. Install sprinkler piping with drains for complete system drainage.

H. Install (or replace the existing) automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.

I. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13. Provide seismic bracing, clearance, restraints, and control system per NFPA 13 and local and state requirements.

J. Fill sprinkler system piping with water.

K. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

L. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

M. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 210518 "Escutcheons for Fire-Suppression Piping."

3.3 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install unions adjacent to each valve in pipes NPS 2 and smaller.

C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.

G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

H. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.

I. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.

J. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.4 INSTALLATION OF COVER SYSTEM FOR SPRINKLER PIPING

A. Install cover system, brackets, and cover components for sprinkler piping according to manufacturer's "Installation Manual" and NFPA 13 for supports.

3.5 VALVE AND SPECIALTIES INSTALLATION

A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

3.6 SPRINKLER INSTALLATION

A. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical ceiling panels.

B. Install sprinklers into flexible, sprinkler hose fittings, and install hose into bracket on ceiling grid.

3.7 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.8 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
4. Energize circuits to electrical equipment and devices.
5. Coordinate with fire-alarm tests. Operate as required.
6. Verify that equipment hose threads are same as local fire department equipment.

B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.9 CLEANING

A. Clean dirt and debris from sprinklers.

B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

3.10 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain specialty valves.

3.11 PIPING SCHEDULE

A. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.

B. Standard-pressure, wet-pipe sprinkler system, NPS 2 and smaller, are one of the following:

1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
2. Standard-weight, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
3. Standard-weight, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
4. Standard-weight or Schedule 30, black-steel pipe with plain ends; steel welding fittings; and welded joints.

C. Standard-pressure, wet-pipe sprinkler system, NPS 2-1/2 to NPS 6, are one of the following:

1. Standard-weight or Schedule 30, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
2. Standard-weight or Schedule 30, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
3. Standard-weight or Schedule 30, black-steel pipe with cut- or roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
4. Standard-weight or Schedule 30, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
5. Standard-weight or Schedule 30, black-steel pipe with plain ends; steel welding fittings; and welded joints.
6. Thin wall Schedule 10 black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
7. Thin wall Schedule 10 black-steel pipe with plain ends; welding fittings; and welded joints.

3.12 SPRINKLER SCHEDULE

A. Use sprinkler types in subparagraphs below for the following applications:

1. Rooms without Ceilings: Upright sprinklers.
2. Rooms with Suspended Ceilings: Pendent, recessed, flush, and concealed sprinklers as indicated.
3. Wall Mounting: Sidewall sprinklers.
4. Spaces Subject to Freezing: Upright, pendent, dry sprinklers; and sidewall, dry sprinklers as indicated.

5. Special Applications: Extended-coverage, and quick-response sprinklers where indicated Attic sprinklers Combustible concealed space sprinklers.

B. Provide sprinkler types in subparagraphs below with finishes indicated.

1. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
2. Flush Sprinklers: Bright chrome, with painted white or consistent with ceiling color escutcheon.
3. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.
4. Upright Pendent and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION 211313

Division 22

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SECTION 220517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sleeves.
2. Stack-sleeve fittings.
3. Sleeve-seal systems.
4. Grout.
5. Silicone sealants.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Pipe Sleeves: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop collar.

B. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, anticorrosion coated galvanized, with plain ends and integral welded waterstop collar.

C. Galvanized-Steel Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

2.2 STACK-SLEEVE FITTINGS

A. Description: Manufactured, galvanized cast-iron sleeve with integral clamping flange for use in waterproof floors and roofs. Include clamping ring, bolts, and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL SYSTEMS

A. Description:

1. Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
2. Designed to form a hydrostatic seal of 20 psig minimum.
3. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
4. Pressure Plates: Stainless steel.
5. Connecting Bolts and Nuts: Stainless steel, Type 316 of length required to secure pressure plates to sealing elements.

2.4 GROUT

A. Description: Nonshrink, for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

A. Silicone, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant, ASTM C 920, Type S, Grade NS, Class 25, Use NT.

B. Silicone, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT. Grade P Pourable (self-leveling) formulation is for opening in floors and other horizontal surfaces that are not fire rated.

C. Silicone Foam: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.

    a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

3. Using grout or silicone sealant, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint.

E. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping and fill materials specified in Section 078413 "Penetration Firestopping."

3.2 STACK-SLEEVE-FITTING INSTALLATION

A. Install stack-sleeve fittings in new slabs as slabs are constructed.

1. Install fittings that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Section 076200 "Sheet Metal Flashing and Trim."
3. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
5. Use silicone sealant to seal the space around outside of stack-sleeve fittings.

B. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke rating of floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Leak Test: After allowing for a full cure, test sleeves and sleeve seals for leaks. Repair leaks and retest until no leaks exist.

B. Sleeves and sleeve seals will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.5 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade:

a. Piping Smaller Than NPS 6: Steel pipe sleeves.
b. Piping NPS 6 and Larger: Steel pipe sleeves.

2. Exterior Concrete Walls below Grade:

a. Piping Smaller Than NPS 6: Cast-iron pipe sleeves with sleeve-seal system.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

b. Piping NPS 6 and Larger: Cast-iron pipe sleeves with sleeve-seal system.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Concrete Slabs-on-Grade:

a. Piping Smaller Than NPS 6: Cast-iron pipe sleeves with sleeve-seal system.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

b. Piping NPS 6 and Larger: Cast-iron pipe sleeves with sleeve-seal system.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

4. Interior Partitions:

a. Piping Smaller Than NPS 6: Steel pipe sleeves.
b. Piping NPS 6 and Larger: Galvanized-steel sheet sleeves.

END OF SECTION 220517

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SECTION 220518 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Escutcheons.
2. Floor plates.

1.3 DEFINITIONS

A. Existing Piping to Remain: Existing piping that is not to be removed and that is not otherwise indicated to be removed and salvaged, or removed and reinstalled.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or equal:

1. BrassCraft Manufacturing Co.; a Masco company.
2. Jones Stephens Corp.
3. Keeney Manufacturing Company (The).

2.2 ESCUTCHEONS

A. One-Piece, Stainless Steel Type: With polished stainless steel finish.

2.3 FLOOR PLATES

A. Split Floor Plates: Cast brass with concealed hinge.

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PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install floor plates for piping penetrations of equipment-room floors.

C. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping and Relocated Existing Piping: One-piece, floor plate.
2. Existing Piping: Split floor plate.

3.2 FIELD QUALITY CONTROL

A. Using new materials, replace broken and damaged escutcheons and floor plates.

END OF SECTION 220518

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SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal hanger-shield inserts.
5. Fastener systems.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:

1. Trapeze pipe hangers.
2. Metal framing systems.

C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of trapeze hangers.
2. Include design calculations for designing trapeze hangers.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

A. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.

B. Pipe Welding Qualifications: Qualify procedures and operators according to 2015 ASME Boiler and Pressure Vessel Code, Section IX.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design trapeze pipe hangers and equipment supports.

B. Structural Performance: Ensure hangers and supports for plumbing piping and equipment withstands the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

2.2 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pre-galvanized, hot-dip galvanized, or electro-galvanized.
3. Nonmetallic Coatings: Plastic coated or epoxy powder coated.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

B. Stainless Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly, made from structural-carbon-steel shapes, with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.4 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Description: Shop- or field-fabricated pipe-support assembly, made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
2. Standard: Comply with MFMA-4, factory-fabricated components for field assembly.
3. Channels: Continuous slotted stainless steel, Type 304 channel with inturned lips.
4. Channel Width: Selected for applicable load criteria.
5. Channel Nuts: Formed or stamped nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

B. Non-MFMA Manufacturer Metal Framing Systems:

1. Description: Shop- or field-fabricated pipe-support assembly, made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
2. Standard: Comply with MFMA-4, factory-fabricated components for field assembly.
3. Channels: Continuous slotted stainless steel channel with inturned lips.
4. Channel Width: Select for applicable load criteria.
5. Channel Nuts: Formed or stamped nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.5 THERMAL HANGER-SHIELD INSERTS

A. Insulation-Insert Material for Cold Piping: ASTM C552, Type II cellular glass with 100-psig minimum compressive strength and vapor barrier.

B. Insulation-Insert Material for Hot Piping: Water-repellent-treated, ASTM C533, Type I calcium silicate with 100-psig minimum compressive strength.

C. For Trapeze or Clamped Systems: Verify insert and shield cover entire circumference of pipe.

D. For Clevis or Band Hangers: Verify insert and shield cover lower 180 degrees of pipe.

E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.6 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type anchors, for use in hardened portland cement concrete, with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Indoor Applications: stainless steel.

2. Outdoor Applications: Stainless steel.

2.7 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural-carbon-steel shapes.

2.8 MATERIALS

A. Aluminum: ASTM B221.

B. Carbon Steel: ASTM A1011/A1011M.

C. Structural Steel: ASTM A36/A36M carbon-steel plates, shapes, and bars; black and galvanized.

D. Stainless Steel: ASTM A240/A240M.

E. Grout: ASTM C1107/C1107M, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation, for penetrations through fire-rated walls, ceilings, and assemblies.

B. Strength of Support Assemblies: Where not indicated, select sizes of components, so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination is the weight of supported components plus 200 lb.

3.2 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size, or install intermediate supports for smaller-diameter pipes as specified for individual pipe hangers.

2. Field fabricate from ASTM A36/A36M carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

D. Thermal Hanger-Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete, after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete, after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

I. Install lateral bracing with pipe hangers and supports to prevent swaying.

J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

K. Load Distribution: Install hangers and supports, so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

M. Insulated Piping:

1. Attach clamps and spacers to piping.

a. Piping Operating Above Ambient Air Temperature: Clamp may project through insulation.
b. Piping Operating Below Ambient Air Temperature: Use thermal hanger-shield insert with clamp sized to match OD of insert.
c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39 protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

    a. Option: Thermal hanger-shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields span an arc of 180 degrees.

    a. Option: Thermal hanger-shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

    a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
    b. NPS 4: 12 inches long and 0.06 inch thick.
    c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
    d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
    e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal Hanger Shields: Install with insulation of same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

4. Finish welds at exposed connections, so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.6 PAINTING

A. Touchup: Clean field welds and abraded, shop-painted areas. Paint exposed areas immediately after erecting hangers and supports. Use same materials as those used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

3.7 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-58 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finishes.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use stainless steel pipe hangers and stainless steel attachments for hostile environment applications.

F. Use padded hangers for piping that is subject to scratching.

G. Use thermal hanger-shield inserts for insulated piping and tubing.

H. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.

4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction occurs.
18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction occurs.
19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction occurs but vertical adjustment is unnecessary.
20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction occurs and vertical adjustment is unnecessary.
21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation, in addition to expansion and contraction, is required.

I. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

J. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment of up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11 split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

K. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable-Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

L. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.

3. Thermal Hanger-Shield Inserts: For supporting insulated pipe.

M. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load, and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load, and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load, and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

    a. Horizontal (MSS Type 54): Mounted horizontally.
    b. Vertical (MSS Type 55): Mounted vertically.
    c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

N. Comply with MSS SP-58 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

O. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

P. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

Q. Use pipe-positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 220529

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SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Valve tags.
5. Warning tags.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: stainless steel, 0.025-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Letter Color: White.
3. Background Color: Black.
4. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

5. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
6. Fasteners: Stainless steel rivets or self-tapping screws.
7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: Yellow.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.

G. Fasteners: Stainless steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.

2. Lettering Size: At least 1/2 inch for viewing distances up to 72 inches and proportionately larger lettering for greater viewing distances.

2.4 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: stainless steel, 0.025-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link chain or beaded chain or S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule included in operation and maintenance data.

2.5 WARNING TAGS

A. Description: Preprinted or partially preprinted accident-prevention tags of plasticized card stock with matte finish suitable for writing.

1. Size: Approximately 4 by 7 inches.
2. Fasteners: Reinforced grommet and wire or string.
3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Safety yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

A. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

B. Directional Flow Arrows: Use arrows to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.

C. Pipe Label Color Schedule:

1. Domestic Water Piping:

   a. Background: Blue.
   b. Letter Colors: White.

2. Natural Gas Piping:

   a. Background: Safety yellow.
   b. Letter Colors: Black

3.5 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

    a. Cold Water: 2 inches, round.
    b. Hot Water: 2 inches, round.

2. Valve-Tag Colors:

    a. Cold Water: Blue.
    b. Hot Water: Red.

3. Letter Colors:

    a. Cold Water: White.
    b. Hot Water: White.

3.6 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 220553

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SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic cold-water piping.
2. Domestic hot-water piping.

1.3 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

1.5 QUALITY ASSURANCE

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products in accordance with ASTM E84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less and smoke-developed index of 150 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come into contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested in accordance with ASTM C871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable in accordance with ASTM C795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Comply with ASTM C552.

1. Preformed Pipe Insulation, Type II, Class 1: Unfaced.
2. Preformed Pipe Insulation, Type II, Class 2: With factory-applied ASJ-SSL jacket.
3. Fabricated shapes in accordance with ASTM C450, ASTM C585, and ASTM C1639.
4. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

G. Flexible Elastomeric: Closed-cell or expanded-rubber materials; suitable for maximum use temperature between minus 70 degrees F and 220 degrees F. Comply with ASTM C534/C534M, Type I for tubular materials.

H. Glass-Fiber, Preformed Pipe: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature up to 850 degrees F in accordance with ASTM C411. Comply with ASTM C547.

1. Preformed Pipe Insulation: Type I, Grade A with factory-applied ASJ-SSL.
2. Fabricated shapes in accordance with ASTM C450 and ASTM C585.
3. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C195.

B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C196.

C. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C449.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 degrees F.

C. Flexible Elastomeric and Polyolefin Adhesive: Solvent-based adhesive.

1. Flame-spread index shall be 25 or less and smoke-developed index shall be 50 or less as tested in accordance with ASTM E84.
2. Wet Flash Point: Below 0 degrees F 40 to 200 degrees F. Color: Black.

D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

E. ASJ Adhesive and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A, for bonding insulation jacket lap seams and joints.

2.4 MASTICS AND COATINGS

A. Materials shall be compatible with insulation materials, jackets, and substrates.

B. Vapor-Barrier Mastic, Water Based: Suitable for indoor use on below-ambient services.

1. Water-Vapor Permeance: Comply with ASTM E96/E96M or ASTM F1249.
2. Service Temperature Range: [0 to plus 180 degrees F Minus 20 to plus 180 degrees F.
3. Comply with MIL-PRF-19565C, Type II, for permeance requirements.
4. Color: White.

C. Vapor-Retarder Mastic, Solvent Based, Indoor Use: Suitable for indoor use on below-ambient services.

1. Water-Vapor Permeance: Comply with ASTM E96/E96M or ASTM F1249.
2. Service Temperature Range: 0 to 180 degrees F.
3. Color: White.

D. Vapor-Retarder Mastic, Solvent Based, Outdoor Use: Suitable for outdoor use on below-ambient services.

1. Water-Vapor Permeance: Comply with ASTM E96/E96M or ASTM F1249.
2. Service Temperature Range: Minus 50 to plus 220 degrees F.
3. Color: White.

E. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Water-Vapor Permeance: ASTM E96/E96M, greater than 1.0 perm at manufacturer's recommended dry film thickness.
2. Service Temperature Range: 0 to plus 180 degrees F.
3. Color: White.

2.5 LAGGING ADHESIVES

A. Adhesives shall comply with MIL-A-3316C, Class I, Grade A, and shall be compatible with insulation materials, jackets, and substrates.

1. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
2. Service Temperature Range: 20 to plus 180 degrees F 0 to plus 180 degrees F.
3. Color: White.

2.6 SEALANTS

A. Materials shall be as recommended by the insulation manufacturer and shall be compatible with insulation materials, jackets, and substrates.

B. Joint Sealants:

1. Permanently flexible, elastomeric sealant.
2. Service Temperature Range: Minus 58 to plus 176 degrees FMinus 100 to plus 300 degrees F.
3. Color: White or gray.

C. ASJ Flashing Sealants and PVC Jacket Flashing Sealants:

1. Fire- and water-resistant, flexible, elastomeric sealant.
2. Service Temperature Range: Minus 40 to plus 250 degrees F.
3. Color: White.

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C1136, Type I.

2.8 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C1136, Type I, unless otherwise indicated.

B. Metal Jacket:

1. Aluminum Jacket: Comply with ASTM B209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.

    a. Factory cut and rolled to size.
    b. Finish and thickness are indicated in field-applied jacket schedules.
    c. Moisture Barrier for Indoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper.
    d. Moisture Barrier for Outdoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper.
    e. Factory-Fabricated Fitting Covers:

        1) Same material, finish, and thickness as jacket.
        2) Preformed two-piece or gore, 45- and 90-degree, short- and long-radius elbows.
        3) Tee covers.
        4) Flange and union covers.
        5) End caps.
        6) Beveled collars.
        7) Valve covers.
        8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

2. Stainless Steel Jacket: ASTM A240/A240M.

    a. Factory cut and rolled to size.
    b. Material, finish, and thickness are indicated in field-applied jacket schedules.
    c. Moisture Barrier for Indoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper.
    d. Moisture Barrier for Outdoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper.
    e. Factory-Fabricated Fitting Covers:

        1) Same material, finish, and thickness as jacket.
        2) Preformed two-piece or gore, 45- and 90-degree, short- and long-radius elbows.
        3) Tee covers.
        4) Flange and union covers.
        5) End caps.
        6) Beveled collars.
        7) Valve covers.
        8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

C. Underground Direct-Buried Jacket: 125-mil- thick vapor barrier and waterproofing membrane, consisting of a rubberized bituminous resin reinforced with a woven-glass fiber or polyester scrim and laminated aluminum foil.

D. Self-Adhesive Outdoor Jacket: 125-mil.

2.9 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C1136.

1. Width: 3 inches.
2. Thickness: 11.5 mils.
3. Adhesion: 90 ounces force/inch in width.
4. Elongation: 2 percent.
5. Tensile Strength: 40 lbf/inch in width.
6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Width: 2 inches.
2. Thickness: 3.7 mils.
3. Adhesion: 100 ounces force/inch in width.
4. Elongation: 5 percent.
5. Tensile Strength: 34 lbf/inch in width.

2.10 SECUREMENTS

A. Bands:

1. Stainless Steel: ASTM A240/A240M, Type 304; 0.015 inch thick, 3/4 inch wide with wing seal or closed seal.
2. Aluminum: ASTM B209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with wing seal or closed seal.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

2.11 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers:

1. Description: Manufactured plastic wraps for covering plumbing fixture hot-water supply and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

B. Protective Shielding Piping Enclosures:

1. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range of between 140 and 300 degrees F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature of between 32 and 300 degrees F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the tradesman installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and of thicknesses required for each item of pipe system, as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during storage, application, and finishing. Replace insulation materials that get wet.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends attached to structure with vapor-barrier mastic.
3. Install insert materials and insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward-clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward-clinching staples along edge at 4 inches o.c.

    a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, in accordance with insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 25 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches in similar fashion to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, Mechanical Couplings, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, mechanical couplings, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as that of adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as that used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as that used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers, so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges, mechanical couplings, and unions, using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Stencil or label the outside insulation jacket of each union with the word “union” matching size and color of pipe labels.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket, except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and

unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as that of adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union at least 2 times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF CELLULAR-GLASS INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.

3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as that of pipe insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as that of straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.7 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as that of pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as that of pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

4. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.8 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as that of straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as that of straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.9 FIELD-APPLIED JACKET INSTALLATION

A. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless steel bands 12 inches o.c. and at end joints.

3.10 FIELD QUALITY CONTROL

A. Perform tests and inspections with the assistance of a factory-authorized service representative.

B. Tests and Inspections: Inspect pipe, fittings, strainers, and valves, randomly selected by Engineer, by removing field-applied jacket and insulation in layers in reverse order of their installation.

C. All insulation applications will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.11 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.12 PIPING INSULATION SCHEDULE

A. Domestic Cold Water:

1. Insulation shall be one of the following:

a. Cellular Glass: 1-1/2 inches thick.
b. Flexible Elastomeric: 1 inch thick.
c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

B. Domestic Hot and Recirculated Hot Water:

1. Insulation shall be one of the following:

a. Cellular Glass: 1-1/2 inches thick.
b. Flexible Elastomeric: 1 inch thick.
c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

3.13 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.

D. Piping, Exposed:

1. Aluminum, Smooth: 0.016 inch thick.
2. Stainless Steel, Type 304, Smooth No. 2B Finish: 0.016 inch thick.

3.14 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.

D. Piping, Exposed:

1. Aluminum, Smooth: 0.016 inch thick.
2. Stainless Steel, Type 304 or Type 316, Smooth No. 2B Finish: 0.016 inch thick.

3.15 UNDERGROUND, FIELD-APPLIED INSULATION JACKET

A. For underground direct-buried piping applications, install underground direct-buried jacket over insulation material.

END OF SECTION 220719

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SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Copper tube and fittings.
2. Piping joining materials.
3. Encasement for piping.
4. Transition fittings.
5. Dielectric fittings.

1.3 ACTION SUBMITTALS

A. Product Data: For transition fittings and dielectric fittings.

1.4 FIELD CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

1. Notify Owner no fewer than two days in advance of proposed interruption of water service.
2. Do not interrupt water service without Owner's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Potable-water piping and components shall comply with NSF 14 and NSF 61 Annex G. Plastic piping components shall be marked with "NSF-pw."

C. Comply with NSF 372 for low lead.

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B88, Type L and ASTM B88, Type M water tube, drawn temper.

B. Soft Copper Tube: ASTM B88, Type K and ASTM B88, Type L water tube, annealed temper.

C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.

D. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

F. Copper Unions:

1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends.

G. Copper Pressure-Seal-Joint Fittings:

1. Fittings for NPS 2 and Smaller: Wrought-copper fitting with EPDM-rubber, O-ring seal in each end.
2. Fittings for NPS 2-1/2 to NPS 4: Cast-bronze or wrought-copper fitting with EPDM-rubber, O-ring seal in each end.

H. Copper Push-on-Joint Fittings:

1. Description:

a. Cast-copper fitting complying with ASME B16.18 or wrought-copper fitting complying with ASME B 16.22.
b. Stainless steel teeth and EPDM-rubber, O-ring seal in each end instead of solder-joint ends.

I. Copper-Tube, Extruded-Tee Connections:

1. Description: Tee formed in copper tube according to ASTM F2014.

J. Appurtenances for Grooved-End Copper Tubing:

1. Bronze Fittings for Grooved-End, Copper Tubing: ASTM B75/B75M copper tube or ASTM B584 bronze castings.
2. Mechanical Couplings for Grooved-End Copper Tubing:

a. Copper-tube dimensions and design similar to AWWA C606.
b. Ferrous housing sections.
c. EPDM-rubber gaskets suitable for hot and cold water.
d. Bolts and nuts.
e. Minimum Pressure Rating: 300 psig.

2.3 ENCASEMENT FOR PIPING

A. Standard: ASTM A674 or AWWA C105/A21.5.

B. Form: tube.

2.4 TRANSITION FITTINGS

A. General Requirements:

1. Same size as pipes to be joined.
2. Pressure rating at least equal to pipes to be joined.
3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

C. Sleeve-Type Transition Coupling: AWWA C219.

D. Plastic-to-Metal Transition Fittings:

1. Description:

a. CPVC or PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions.
b. One end with threaded brass insert and one solvent-cement-socket or threaded end.

E. Plastic-to-Metal Transition Unions:

1. Description:

a. CPVC or PVC four-part union.
b. Brass or stainless steel threaded end.
c. Solvent-cement-joint or threaded plastic end.
d. Rubber O-ring.
e. Union nut.

2.5 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Standard: ASSE 1079.
2. Pressure Rating: 250 psig.
3. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:

1. Standard: ASSE 1079.
2. Factory-fabricated, bolted, companion-flange assembly.
3. Pressure Rating: 300 psig.
4. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits:

1. Nonconducting materials for field assembly of companion flanges.
2. Pressure Rating: 150 psig.
3. Gasket: Neoprene or phenolic.
4. Bolt Sleeves: Phenolic or polyethylene.
5. Washers: Phenolic with steel backing washers.

E. Dielectric Nipples:

1. Standard: IAPMO PS 66.
2. Electroplated steel nipple complying with ASTM F1545.
3. Pressure Rating and Temperature: 300 psig at 225 deg F.
4. End Connections: Male threaded or grooved.
5. Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in Section 312000 "Earthwork" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install underground copper tube in PE encasement according to ASTM A674 or AWWA C105/A21.5.

D. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Section 221119 "Domestic Water Piping Specialties."

E. Install shutoff valve immediately upstream of each dielectric fitting.

F. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements for pressure-reducing valves in Section 221119 "Domestic Water Piping Specialties."

G. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.

H. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

I. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

J. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

K. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

L. Install piping to permit valve servicing.

M. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

N. Install piping free of sags and bends.

O. Install fittings for changes in direction and branch connections.

P. Install PEX tubing with loop at each change of direction of more than 90 degrees.

Q. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

R. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

S. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

T. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

E. Soldered Joints for Copper Tubing: Apply flux to end of tube. Join copper tube and fittings according to ASTM B828 or CDA's "Copper Tube Handbook."

F. Pressure-Sealed Joints for Copper Tubing: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.

G. Push-on Joints for Copper Tubing: Clean end of tube. Measure insertion depth with manufacturer's depth gage. Join copper tube and push-on-joint fittings by inserting tube to measured depth.

H. Extruded-Tee Connections: Form tee in copper tube according to ASTM F2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.

I. Joint Construction for Grooved-End Copper Tubing: Make joints according to AWWA C606. Roll groove ends of tubes. Lubricate and install gasket over ends of tubes or tube and fitting. Install coupling housing sections over gasket with keys seated in tubing grooves. Install and tighten housing bolts.

J. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

K. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.4 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:

1. Fittings for NPS 1-1/2 and Smaller: Fitting-type coupling.
2. Fittings for NPS 2 and Larger: Sleeve-type coupling.

C. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller: Plastic-to-metal transition fittings or unions.

3.5 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges.

D. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

3.6 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hangers, supports, and anchor devices in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:

    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Install hangers for copper tubing and piping, with maximum horizontal spacing and minimum rod diameters, to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

D. Support horizontal piping within 12 inches of each fitting.

E. Support vertical runs of copper tubing and piping to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
2. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
3. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.8 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Section 220553 "Identification for Plumbing Piping and Equipment."

B. Label pressure piping with system operating pressure.

3.9 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Inspections:

a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.

c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

2. Piping Tests:

a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.

c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.10 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

    a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
    b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.11 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.

b. Fill and isolate system according to either of the following:

1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
d. Repeat procedures if biological examination shows contamination.
e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Clean non-potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging procedures prescribed by authorities having jurisdiction; or, if methods are not prescribed, follow procedures described below:

a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

C. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.12 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

D. Under-building-slab, domestic water, building-service piping shall be the following:

1. Soft copper tube, ASTM B88, Type K; wrought-copper, solder-joint fittings; and brazed joints.

E. Aboveground domestic water piping,, shall be one of the following:

1. Hard copper tube, ASTM B88, Type L or ASTM B88, Type M; copper pressure-seal-joint fittings; and pressure-sealed joints.
2. Hard copper tube, ASTM B88, Type L or ASTM B88, Type M; copper push-on-joint fittings; and push-on joints.

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3.13 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball or gate valves for piping NPS 2 and smaller. Use butterfly, ball, or gate valves with flanged ends for piping NPS 2-1/2 and larger.
2. Throttling Duty: Use ball or globe valves for piping NPS 2 and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 and larger.
3. Hot-Water Circulation Piping, Balancing Duty: Memory-stop balancing valves.
4. Drain Duty: Hose-end drain valves.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

C. Iron grooved-end valves may be used with grooved-end piping.

END OF SECTION 221116

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SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Vacuum breakers.
2. Backflow preventers.
3. Strainers.
4. Drain valves.
5. Water-hammer arresters.
6. Air vents.
7. Trap-seal primer valves.
8. Trap-seal primer systems.
9. Flexible connectors.
10. Water meters.

B. Related Requirements:

1. Section 221116 "Domestic Water Piping" for water meters.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Potable-water piping and components comply with NSF 61 Annex G and NSF 14.

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

2.3 VACUUM BREAKERS

A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:

1. Standard: ASSE 1001.
2. Size: NPS 1/4 to NPS 3, as required to match connected piping.
3. Body: Bronze.
4. Inlet and Outlet Connections: Threaded.
5. Finish: Chrome plated.

B. Laboratory-Faucet Vacuum Breakers:

1. Standard: ASSE 1035.
2. Size: NPS 1/4 or NPS 3/8 matching faucet size.
3. Body: Bronze.
4. End Connections: Threaded.
5. Finish: Chrome plated.

2.4 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers:

1. Standard: ASSE 1013.
2. Operation: Continuous-pressure applications.
3. Pressure Loss: 12 psig maximum, through middle third of flow range.
4. Size: 2 NPS.
5. Body: Bronze for NPS 2 and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved for NPS 2-1/2 and larger.
6. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
7. Configuration: Designed for horizontal, straight-through flow.
8. Accessories:

    a. Valves NPS 2 and Smaller: Ball type with threaded ends on inlet and outlet.
    b. Valves NPS 2-1/2 and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.
    c. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

2.5 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers:

1. Pressure Rating: 125 psig minimum unless otherwise indicated.
2. Body: Bronze for NPS 2 and smaller; cast iron for NPS 2-1/2 and larger.
3. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
4. Screen: Stainless steel with round perforations unless otherwise indicated.
5. Perforation Size:

    a. Strainers NPS 2 and Smaller: 0.020 inch.
    b. Strainers NPS 2-1/2 to NPS 4: 0.045 inch.

c. Strainers NPS 5 and Larger: 0.10 inch.

6. Drain: Factory-installed, hose-end drain valve.

2.6 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig minimum CWP.
3. Size: NPS 3/4.
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

2.7 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters:

1. Standard: ASSE 1010 or PDI-WH 201.
2. Type: Copper tube with piston.
3. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

2.8 AIR VENTS

A. Bolted-Construction Automatic Air Vents:

1. Body: Bronze.
2. Pressure Rating and Temperature: 125-psig minimum pressure rating at 140 deg F.
3. Float: Replaceable, corrosion-resistant metal.
4. Mechanism and Seat: Stainless steel.
5. Size: NPS 1/2 minimum inlet.
6. Inlet and Vent Outlet End Connections: Threaded.

B. Welded-Construction Automatic Air Vents:

1. Body: Stainless steel.
2. Pressure Rating: 150-psig minimum pressure rating.
3. Float: Replaceable, corrosion-resistant metal.
4. Mechanism and Seat: Stainless steel.
5. Size: NPS 3/8 minimum inlet.
6. Inlet and Vent Outlet End Connections: Threaded.

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2.9 TRAP-SEAL PRIMER DEVICE

A. Supply-Type, Trap-Seal Primer Device:

1. Standard: ASSE 1018.
2. Pressure Rating: 125 psig minimum.
3. Body: Bronze.
4. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
5. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
6. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

B. Drainage-Type, Trap-Seal Primer Device:

1. Standard: ASSE 1044, lavatory P-trap with NPS 3/8 minimum, trap makeup connection.
2. Size: NPS 1-1/4 minimum.
3. Material: Chrome-plated, cast brass.

2.10 TRAP-SEAL PRIMER SYSTEMS

A. Trap-Seal Primer Systems:

1. Standard: ASSE 1044.
2. Piping: NPS 3/4, ASTM B88, Type L; copper, water tubing.
3. Cabinet: Surface-mounted steel box with stainless steel cover.
4. Electric Controls: 24-hour timer, solenoid valve, and manual switch for 120-V ac power.

    a. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

5. Vacuum Breaker: ASSE 1001.
6. Number Outlets: Eight.
7. Size Outlets: NPS 1/2.

2.11 FLEXIBLE CONNECTORS

A. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.

1. Working-Pressure Rating: Minimum 250 psig.
2. End Connections NPS 2 and Smaller: Threaded copper pipe or plain-end copper tube.
3. End Connections NPS 2-1/2 and Larger: Flanged copper alloy.

B. Stainless Steel-Hose Flexible Connectors: Corrugated-stainless steel tubing with stainless steel wire-braid covering and ends welded to inner tubing.

1. Working-Pressure Rating: Minimum 250 psig.
2. End Connections NPS 2 and Smaller: Threaded steel-pipe nipple.
3. End Connections NPS 2-1/2 and Larger: Flanged steel nipple.

2.12 WATER METERS

A. Displacement-Type Water Meters:

1. Description:

a. Standard: AWWA C700.
b. Pressure Rating: 150-psig working pressure.
c. Body Design: Nutating disc; totalization meter.
d. Registration: In gallons or cubic feet as required by utility company.
e. Case: Bronze.
f. End Connections: Threaded.

B. Turbine-Type Water Meters:

1. Description:

a. Standard: AWWA C701.
b. Pressure Rating: 150-psig working pressure.
c. Body Design: Turbine; totalization meter.
d. Registration: In gallons or cubic feet as required by utility company.
e. Case: Bronze.
f. End Connections for Meters NPS 2 and Smaller: Threaded.
g. End Connections for Meters NPS 2-1/2 and Larger: Flanged.

C. Compound-Type Water Meters:

1. Description:

a. Standard: AWWA C702.
b. Pressure Rating: 150-psig working pressure.
c. Body Design: With integral mainline and bypass meters; totalization meter.
d. Registration: In gallons or cubic feet as required by utility company.
e. Case: Bronze.
f. Pipe Connections: Flanged.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.

1. Locate backflow preventers in same room as connected equipment or system.
2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.

3. Do not install bypass piping around backflow preventers.

B. Install water regulators with inlet and outlet shutoff valves and bypass with memory-stop balancing valve. Install pressure gages on inlet and outlet.

C. Install water-hammer arresters in water piping according to PDI-WH 201.

D. Install air vents at high points of water piping.

E. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

F. Install drainage-type, trap-seal primer valves as lavatory trap with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting.

G. Install trap-seal primer systems with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust system for proper flow.

3.2 CONNECTIONS

A. Comply with requirements for ground equipment in Section 260526 "Grounding and Bonding for Electrical Systems."

B. Fire-retardant-treated-wood blocking is specified in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for electrical connections.

3.3 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:

1. Pressure vacuum breakers.
2. Intermediate atmospheric-vent backflow preventers.
3. Reduced-pressure-principle backflow preventers.
4. Double-check, backflow-prevention assemblies.
5. Carbonated-beverage-machine backflow preventers.
6. Dual-check-valve backflow preventers.
7. Reduced-pressure-detector, fire-protection, backflow-preventer assemblies.
8. Double-check, detector-assembly backflow preventers.
9. Water pressure-reducing valves.
10. Calibrated balancing valves.
11. Primary, thermostatic, water mixing valves.
12. Manifold, thermostatic, water mixing-valve assemblies.
13. Photographic-process, thermostatic, water mixing-valve assemblies.
14. Primary water tempering valves.
15. Outlet boxes.
16. Hose stations.
17. Supply-type, trap-seal primer valves.

18. Trap-seal primer systems.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test each reduced-pressure-principle backflow preventer according to authorities having jurisdiction and the device's reference standard.

B. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.5 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

B. Set field-adjustable flow set points of balancing valves.

C. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

END OF SECTION 221119

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SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Hub-and-spigot, cast-iron soil pipe and fittings.
2. Hubless, cast-iron soil pipe and fittings.
3. PVC pipe and fittings.
4. Specialty pipe fittings.
5. Encasement for underground metal piping.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 FIELD CONDITIONS

A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Owner no fewer than days in advance of proposed interruption of sanitary waste service.
2. Do not proceed with interruption of sanitary waste service without Owner's written permission.

1.5 WARRANTY

A. Listed manufacturers to provide labeling and warranty of their respective products.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Components and installation capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water.

2.2 PIPING MATERIALS

A. Piping materials bear label, stamp, or other markings of specified testing agency.

B. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.3 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A74, Service class(es).

B. Gaskets: ASTM C564, rubber.

C. Caulking Materials: ASTM B29, pure lead and oakum or hemp fiber.

2.4 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A888 or CISPI 301.

B. Single-Stack Aerator Fittings: ASME B16.45, hubless, cast-iron aerator and deaerator drainage fittings.

C. CISPI, Hubless-Piping Couplings:

1. Standards: ASTM C1277 and CISPI 310.
2. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C564, rubber sleeve with integral, center pipe stop.

D. Cast-Iron, Hubless-Piping Couplings:

1. Standard: ASTM C1277.
2. Description: Two-piece ASTM A48/A48M, cast-iron housing; stainless-steel bolts and nuts; and ASTM C564, rubber sleeve with integral, center pipe stop.

2.5 PVC PIPE AND FITTINGS

A. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

B. Solid-Wall PVC Pipe: ASTM D2665, drain, waste, and vent.

C. Cellular-Core PVC Pipe: ASTM F891, Schedule 40.

D. PVC Socket Fittings: ASTM D2665, made to ASTM D3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

E. Adhesive Primer: ASTM F656.

F. Solvent Cement: ASTM D2564.

2.6 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
2. Unshielded, Nonpressure Transition Couplings:

    a. Standard: ASTM C1173.
    b. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
    c. End Connections: Same size as and compatible with pipes to be joined.
    d. Sleeve Materials:

        1) For Cast-Iron Soil Pipes: ASTM C564, rubber.
        2) For Plastic Pipes: ASTM F477, elastomeric seal or ASTM D5926, PVC.
        3) For Dissimilar Pipes: ASTM D5926, PVC or other material compatible with pipe materials being joined.

3. Shielded, Nonpressure Transition Couplings:

    a. Standard: ASTM C1460.
    b. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
    c. End Connections: Same size as and compatible with pipes to be joined.

4. Pressure Transition Couplings:

    a. Standard: AWWA C219.
    b. Description: Metal, sleeve-type same size as, with pressure rating at least equal to, and ends compatible with, pipes to be joined.
    c. Center-Sleeve Material: Ductile iron.

d. Gasket Material: Natural or synthetic rubber.
e. Metal Component Finish: Corrosion-resistant coating or material.

B. Dielectric Fittings:

1. Dielectric Unions:

a. Description:

1) Standard: ASSE1079.
2) Pressure Rating: 250 psig.
3) End Connections: Solder-joint copper alloy and threaded ferrous.

2. Dielectric Flanges:

a. Description:

1) Standard: ASSE 1079.
2) Factory-fabricated, bolted, companion-flange assembly.
3) Pressure Rating: 300 psig.
4) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

3. Dielectric-Flange Insulating Kits:

a. Description:

1) Nonconducting materials for field assembly of companion flanges.
2) Pressure Rating: 150 psig.
3) Gasket: Neoprene or phenolic.
4) Bolt Sleeves: Phenolic or polyethylene.
5) Washers: Phenolic with steel backing washers.

4. Dielectric Nipples:

a. Description:

1) Standard: IAPMO PS 66.
2) Electroplated steel nipple.
3) Pressure Rating: 300 psig at 225 degrees F.
4) End Connections: Male threaded or grooved.
5) Lining: Inert and noncorrosive, propylene.

2.7 ENCASEMENT FOR UNDERGROUND METAL PIPING

A. Standard: ASTM A674 or AWWA C105/A 21.5.

B. Material: high-density, cross-laminated polyethylene film of 0.004-inch minimum thickness.

C. Form: Tube.

D. Color: Black.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earthwork."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.

1. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
2. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends.

1. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical.
2. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe.

    a. Straight tees, elbows, and crosses may be used on vent lines.

3. Do not change direction of flow more than 90 degrees.

4. Use proper size of standard increasers and reducers if pipes of different sizes are connected.

    a. Reducing size of waste piping in direction of flow is prohibited.

K. Lay buried building waste piping beginning at low point of each system.

1. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream.
2. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
3. Maintain swab in piping and pull past each joint as completed.

L. Install soil and waste and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Waste: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
2. Horizontal Sanitary Waste Piping: 2 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

M. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A674 or AWWA C105/A 21.5.

N. Install aboveground PVC piping according to ASTM D2665.

O. Install engineered soil and waste and vent piping systems as follows:

1. Combination Waste and Vent: Comply with standards of authorities having jurisdiction.
2. Hubless, Single-Stack Drainage System: Comply with ASME B16.45 and hubless, single-stack aerator fitting manufacturer's written installation instructions.
3. Reduced-Size Venting: Comply with standards of authorities having jurisdiction.

P. Plumbing Specialties:

1. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary waste gravity-flow piping.

    a. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping.
    b. Comply with requirements for cleanouts specified in Section 221319 "Sanitary Waste Piping Specialties."

2. Install drains in sanitary waste gravity-flow piping.

    a. Comply with requirements for drains specified in Section 221319 "Sanitary Waste Piping Specialties."

Q. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

R. Install sleeves for piping penetrations of walls, ceilings, and floors.

1. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

S. Install sleeve seals for piping penetrations of concrete walls and slabs.

1. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

T. Install escutcheons for piping penetrations of walls, ceilings, and floors.

1. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.

C. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1.

1. Cut threads full and clean using sharp dies.
2. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
c. Do not use pipe sections that have cracked or open welds.

E. Grooved Joints: Cut groove ends of pipe according to AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.

F. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

G. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join according to ASTM D2235 and ASTM D 2661 appendixes.
3. PVC Piping: Join according to ASTM D2855 and ASTM D 2665 appendixes.

3.4 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in ODs.
2. In Waste Drainage Piping: Shielded, nonpressure transition couplings.
3. In Aboveground Force Main Piping: Fitting-type transition couplings.
4. In Underground Force Main Piping:

    a. NPS 1-1/2 and Smaller: Fitting-type transition couplings.
    b. NPS 2 and Larger: Pressure transition couplings.

B. Dielectric Fittings:

1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
2. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.
3. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges.
4. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

3.5 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Install stainless-steel pipe hangers for horizontal piping in corrosive environments.
2. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
3. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
4. Vertical Piping: MSS Type 8 or Type 42, clamps.
5. Install individual, straight, horizontal piping runs:

    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

6. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
7. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Install hangers for cast-iron soil piping, with maximum horizontal spacing and minimum rod diameters to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

C. Install hangers for PVC piping, with maximum horizontal spacing and minimum rod diameters to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

D. Support horizontal piping and tubing within 12 inches of each fitting, valve, and coupling.

E. Support vertical runs of cast iron soil piping to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

F. Support vertical runs for PVC piping to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

3.6 CONNECTIONS

A. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

B. Connect waste and vent piping to the following:

1. Plumbing Fixtures: Connect waste piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect waste and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
5. Comply with requirements for cleanouts and drains specified in Section 221319 "Sanitary Waste Piping Specialties."
6. Equipment: Connect waste piping as indicated.

    a. Provide shutoff valve if indicated and union for each connection.
    b. Use flanges instead of unions for connections NPS 2-1/2 and larger.

C. Connect force-main piping to the following:

1. Sanitary Sewer: To exterior force main.
2. Sewage Pump: To sewage pump discharge.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

E. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.7 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping.

B. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.8 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary waste and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.

    a. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.

2. Leave uncovered and unconcealed new, altered, extended, or replaced waste and vent piping until it has been tested and approved.

    a. Expose work that was covered or concealed before it was tested.

3. Roughing-in Plumbing Test Procedure: Test waste and vent piping except outside leaders on completion of roughing-in.

    a. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water.
    b. From 15 minutes before inspection starts to completion of inspection, water level must not drop.
    c. Inspect joints for leaks.

4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight.

    a. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg.
    b. Use U-tube or manometer inserted in trap of water closet to measure this pressure.

c. Air pressure must remain constant without introducing additional air throughout period of inspection.
d. Inspect plumbing fixture connections for gas and water leaks.

5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

E. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved.

a. Expose work that was covered or concealed before it was tested.

2. Cap and subject piping to static-water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials.

a. Isolate test source and allow to stand for four hours.
b. Leaks and loss in test pressure constitute defects that must be repaired.

3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
4. Prepare reports for tests and required corrective action.

3.9 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect sanitary waste and vent piping during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

D. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

E. Repair damage to adjacent materials caused by waste and vent piping installation.

3.10 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground, soil and waste piping are any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

C. Aboveground, vent piping are any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

D. Underground, soil, waste, and vent piping are any of the following:

1. Service class, cast-iron soil piping; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI cast-iron hubless-piping couplings; and coupled joints.
3. Solid wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

END OF SECTION 221316

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SECTION 221319 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cleanouts.
2. Roof flashing assemblies.
3. Through-penetration firestop assemblies.
4. Miscellaneous sanitary drainage piping specialties.

1.3 DEFINITIONS

A. PVC: Polyvinyl chloride.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rated capacities, operating characteristics, and accessories for the following:

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTIONS

A. Sanitary waste piping specialties bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14 for plastic sanitary waste piping specialty components.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing, and marked for intended location and application.

2.2 CLEANOUTS

A. Stainless Steel Exposed Cleanouts:

1. Standard: ASME A112.3.1.
2. Size: Same as connected drainage piping
3. Body Material: Stainless steel tee with side cleanout as required to match connected piping.
4. Closure: Stainless steel plug with seal.

B. Stainless Steel Exposed Floor Cleanouts:

1. Standard: ASME A112.3.1.
2. Size: Same as connected branch.
3. Housing: Stainless steel.
4. Closure: Stainless steel with seal.
5. Riser: ASTM A74, Service class, stainless steel drainage pipe fitting and riser to cleanout.
6. Body or Ferrule: Stainless steel.
7. Clamping Device: Required.
8. Outlet Connection: Threaded.
9. Closure: Brass plug with straight threads and gasket.
10. Adjustable Housing Material: Cast iron with threads set screws or other device.
11. Frame and Cover Material and Finish: Stainless steel.
12. Frame and Cover Shape: Round.
13. Top Loading Classification: Heavy Duty.

2.3 ROOF FLASHING ASSEMBLIES

A. Roof Flashing Assemblies:

1. Description: Manufactured assembly made of 4.0-lb/sq. ft., 0.0625-inch- thick, lead flashing collar and skirt extending at least 6 inches from pipe, with galvanized-steel boot reinforcement and counterflashing fitting.

   a. Open-Top Vent Cap: Without cap.
   b. Low-Silhouette Vent Cap: With vandal-proof vent cap.
   c. Extended Vent Cap: With field-installed, vandal-proof vent cap.

2.4 THROUGH-PENETRATION FIRESTOP ASSEMBLIES

A. Through-Penetration Firestop Assemblies:

1. Standard: UL 1479 assembly of sleeve-and-stack fitting with firestopping plug.
2. Size: Same as connected soil, waste, or vent stack.
3. Sleeve: Molded-PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.
4. Stack Fitting: ASTM A48/A48M, gray-iron, hubless-pattern wye branch with neoprene O-ring at base and gray-iron plug in thermal-release harness. Include PVC protective cap for plug.
5. Special Coating: Corrosion resistant on interior of fittings.

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2.5 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Open Drains:

1. Description: Shop or field fabricate from ASTM A74, Service class, hub-and-spigot, cast-iron soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting joined with ASTM C564 rubber gaskets.
2. Size: Same as connected waste piping with increaser fitting of size indicated.

B. Deep-Seal Traps:

1. Description: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap-seal primer valve connection.
2. Size: Same as connected waste piping.

    a. NPS 2: 4-inch- minimum water seal.
    b. NPS 2-1/2 and Larger: 5-inch- minimum water seal.

C. Floor-Drain, Trap-Seal Primer Fittings:

1. Description: Cast iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
2. Size: Same as floor drain outlet with NPS 1/2 side inlet.

D. Air-Gap Fittings:

1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
2. Body: Bronze or cast iron.
3. Inlet: Opening in top of body.
4. Outlet: Larger than inlet.
5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.

E. Sleeve Flashing Device:

1. Description: Manufactured, cast-iron fitting, with clamping device that forms sleeve for pipe floor penetrations of floor membrane. Include galvanized-steel pipe extension in top of fitting that will extend 1 inch above finished floor and galvanized-steel pipe extension in bottom of fitting that will extend through floor slab.
2. Size: As required for close fit to riser or stack piping.

F. Stack Flashing Fittings:

1. Description: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
2. Size: Same as connected stack vent or vent stack.

G. Vent Caps:

1. Description: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
2. Size: Same as connected stack vent or vent stack.

H. Expansion Joints:

1. Standard: ASME A112.6.4.
2. Body: Cast iron with bronze sleeve, packing, and gland.
3. End Connections: Matching connected piping.
4. Size: Same as connected soil, waste, or vent piping.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Equipment Mounting:

1. Comply with requirements for vibration-isolation and seismic-control devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
4. Locate at base of each vertical soil and waste stack.

C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

E. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof. Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."

F. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof. Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."

G. Install through-penetration firestop assemblies in plastic conductors and stacks at floor penetrations.

1. Comply with requirements in Section 078413 "Penetration Firestopping."

H. Assemble open drain fittings and install with top of hub 2 inches above floor.

I. Install deep-seal traps on floor drains and other waste outlets, if indicated.

J. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.

1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
2. Size: Same as floor drain inlet.

K. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

L. Install sleeve and sleeve seals with each riser and stack passing through floors with waterproof membrane.

M. Install vent caps on each vent pipe passing through roof.

N. Install expansion joints on vertical stacks and conductors. Position expansion joints for easy access and maintenance.

O. Install wood-blocking reinforcement for wall-mounting-type specialties.

P. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.2 CONNECTIONS

A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

3.3 FLASHING INSTALLATION

A. Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."

B. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required.

C. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.

D. Set flashing on floors and roofs in solid coating of bituminous cement.

E. Secure flashing into sleeve and specialty clamping ring or device.

F. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Section 076200 "Sheet Metal Flashing and Trim."

G. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

3.4 LABELING AND IDENTIFYING

A. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit.

1. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.5 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.6 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221319

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SECTION 221319.13 - SANITARY DRAINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Floor drains.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene styrene.

B. FRP: Fiberglass-reinforced plastic.

C. HDPE: High-density polyethylene.

D. PE: Polyethylene.

E. PP: Polypropylene.

F. PVC: Polyvinyl chloride.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 DRAIN ASSEMBLIES

A. Sanitary drains bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14 for plastic sanitary piping specialty components.

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2.2 FLOOR DRAINS

A. Stainless Steel Floor Drains, ASME A112.3.1:

1. Outlet: Bottom.
2. Top or Strainer Material: Stainless steel.
3. Top Shape: Round.
4. Seepage Flange: Required.
5. Anchor Flange: Required.
6. Clamping Device: Required.
7. Trap-Primer Connection: Required.
8. Trap Material: Stainless steel.
9. Trap Pattern: Deep-seal P-trap.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage.
3. Set with grates depressed according to the following drainage area radii:

a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.

4. Install floor-drain flashing collar or flange, so no leakage occurs between drain and adjoining flooring.

a. Maintain integrity of waterproof membranes where penetrated.

5. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

B. Install trench drains at low points of surface areas to be drained.

1. Set grates of drains flush with finished surface, unless otherwise indicated.

C. Comply with ASME A112.3.1 for installation of stainless steel channel drainage systems.

1. Install on support devices, so that top will be flush with adjacent surface.

D. Install open drain fittings with top of hub 1 inch above floor.

3.2 CONNECTIONS

A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Comply with requirements in Section 221319 "Sanitary Waste Piping Specialties" for backwater valves, air admittance devices and miscellaneous sanitary drainage piping specialties.

C. Comply with requirements in Section 221323 "Sanitary Waste Interceptors" for grease interceptors, grease-removal devices, oil interceptors, sand interceptors, and solid interceptors.

D. Install piping adjacent to equipment to allow service and maintenance.

3.3 LABELING AND IDENTIFYING

A. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

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SECTION 223300 - ELECTRIC, DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Flow-control, electric, tankless, domestic-water heaters.
2. Thermostat-control, electric, tankless, domestic-water heaters.
3. Domestic-water heater accessories.

1.3 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For electric, domestic-water heaters to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and use.

B. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61 and NSF 372.

2.2 ELECTRIC, TANKLESS, DOMESTIC-WATER HEATERS

A. Flow-Control, Electric, Tankless, Domestic-Water Heaters:

1. Basis of design: Chronomite INSTANT FLOW® MICRO MIX™

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:

    a. Bradley Corporation.
    b. Eemax, Inc.; a Rheem brand.
    c. Stiebel Eltron, Inc.

3. Source Limitations: Obtain domestic-water heaters from single source from single manufacturer.
4. Standard: UL 499 for electric, tankless, (domestic-water heater) heating appliance.
5. Construction: Copper piping or tubing complying with NSF 61 and NSF 372 barrier materials for potable water, without storage capacity.

    a. Connections: ASME B1.20.1 pipe thread.
    b. Pressure Rating: 150 psig.
    c. Heating Element: Resistance heating system.
    d. Temperature Control: Flow-control fitting.
    e. Safety Control: High-temperature-limit cutoff device or system.
    f. Jacket: Aluminum or steel with enameled finish or plastic.

6. Support: Bracket for wall mounting.

B. Thermostat-Control, Electric, Tankless, Domestic-Water Heaters:

1. Basis of design: Chronomite INSTANT FLOW® INSTANT-TEMP™

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Bradley Corporation.
    b. Eemax, Inc.; a Rheem brand.
    c. Stiebel Eltron, Inc.

3. Source Limitations: Obtain domestic-water heaters from single source from single manufacturer.
4. Standard: UL 499 for electric, tankless, (domestic-water heater) heating appliance.
5. Construction: Copper piping or tubing complying with NSF 61 and NSF 372 barrier materials for potable water, without storage capacity.

    a. Connections: ASME B1.20.1 pipe thread.
    b. Pressure Rating: 150 psig.
    c. Heating Element: Resistance heating system.
    d. Temperature Control: Thermostat.
    e. Safety Control: High-temperature-limit cutoff device or system.
    f. Jacket: Aluminum or steel with enameled finish or plastic.

6. Support: Bracket for wall mounting.

2.3 DOMESTIC-WATER HEATER ACCESSORIES

A. Combination Temperature-and-Pressure Relief Valves: ASME rated and stamped. Include relieving capacity at least as great as heat input, and include pressure setting less than working-pressure rating of domestic-water heater. Select relief valves with sensing element that extends into storage tank.

B. Domestic-Water Heater Mounting Brackets: Manufacturer's factory-fabricated steel bracket for wall mounting, capable of supporting domestic-water heater and water.

2.4 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect domestic-water heaters specified to be ASME-code construction, in accordance with ASME Boiler and Pressure Vessel Code.

B. Hydrostatically test commercial domestic-water heaters to minimum of one and one-half times pressure rating before shipment.

C. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

A. Electric, Tankless, Domestic-Water Heater Mounting: Install electric, tankless, domestic-water heaters at least 18 inches above floor on wall bracket.

1. Maintain manufacturer's recommended clearances.
2. Arrange units so controls and devices that require servicing are accessible.
3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.
5. Anchor domestic-water heaters to substrate.

B. Install electric, domestic-water heaters level and plumb, in accordance with layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves specified in Section 220523.12 "Ball Valves for Plumbing Piping," Section 220523.13 "Butterfly Valves for Plumbing Piping," and Section 220523.15 "Gate Valves for Plumbing Piping."

C. Install commercial, electric, domestic-water heaters with seismic-restraint devices.

D. Install combination temperature-and-pressure relief valves in water piping for electric, domestic-water heaters without storage. Extend domestic-water heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

E. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for electric, domestic-water heaters that do not have tank drains. Comply with requirements for hose-end drain valves specified in Section 221119 "Domestic Water Piping Specialties."

F. Install piping-type heat traps on inlet and outlet piping of electric, domestic-water heater storage tanks without integral or fitting-type heat traps.

G. Fill electric, domestic-water heaters with water.

H. Charge domestic-water expansion tanks with air to required system pressure.

I. Install dielectric fittings in all locations where piping of dissimilar metals is to be joined. Verify the wetted surface of the dielectric fitting contacted by potable water contains less than 0.25 percent of lead by weight.

3.2 PIPING CONNECTIONS

A. Comply with requirements for piping specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to electric, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.3 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain tankless, electric, domestic-water heaters. Training: a minimum of one hour.

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SECTION 224213.13 - COMMERCIAL WATER CLOSETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Water closets.
2. Flushometer valves.
3. Toilet seats.
4. Supports.

1.3 DEFINITIONS

A. Effective Flush Volume: Average of two reduced flushes and one full flush per fixture.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for water closets.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flushometer valves and electronic sensors to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 FLOOR-MOUNTED, BACK-OUTLET WATER CLOSETS

A. Water Closets: Floor mounted, back outlet, top spud.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. American Standard.
    b. Kohler Co.
    c. Zurn Industries, LLC.

2. Bowl:

    a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
    b. Material: Vitreous china.
    c. Type: Siphon jet.
    d. Style: Flushometer valve.
    e. Height: Standard.
    f. Rim Contour: Elongated.
    g. Water Consumption: Maximum 1.28 gal. per flush.
    h. Spud Size and Location: NPS 1-1/2; top.
    i. Color: White.

3. Water-Closet Mounting Height: Handicapped/elderly according to ICC/ANSI A117.1.

2.2 WALL-MOUNTED WATER CLOSETS

A. Water Closets: Wall mounted, top spud, accessible.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. American Standard.
    b. Kohler Co.
    c. Zurn Industries, LLC.

2. Bowl:

    a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
    b. Material: Vitreous china.
    c. Type: Siphon jet.
    d. Style: Flushometer valve.
    e. Height: Standard.
    f. Rim Contour: Elongated.
    g. Water Consumption: Maximum 1.28 gal. per flush.
    h. Spud Size and Location: NPS 1-1/2; top.

3. Water-Closet Mounting Height: Handicapped/elderly according to ICC/ANSI A117.1.

2.3 FLUSHOMETER VALVES

A. Hard-Wired, Solenoid-Actuator, Piston Flushometer Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. American Standard.
    b. Sloan Valve Company.
    c. Zurn Industries, LLC.

2. Standard: ASSE 1037.
3. Minimum Pressure Rating: 125 psig.
4. Features: Include integral check stop and backflow-prevention device.
5. Material: Brass body with corrosion-resistant components.
6. Exposed Flushometer-Valve Finish: Chrome plated.
7. Panel Finish: Chrome plated or stainless steel.
8. Style: Concealed.
9. Actuator: Solenoid complying with UL 1951, and listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
10. Trip Mechanism: Hard-wired electronic sensor complying with UL 1951, and listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
11. Consumption: Maximum 1.28 gal. per flush.
12. Minimum Inlet: NPS 1.
13. Minimum Outlet: NPS 1-1/4.

2.4 TOILET SEATS

A. Toilet Seats:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. American Standard.
    b. Kohler Co.
    c. Zurn Industries, LLC.

2. Standard: IAPMO/ANSI Z124.5.
3. Material: Plastic.
4. Type: Commercial (Standard).
5. Shape: Elongated rim, open front.
6. Hinge: Self-sustaining, check.
7. Hinge Material: Noncorroding metal.
8. Seat Cover: Required.
9. Color: White.

2.5 SUPPORTS

A. Water Closet Carrier:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. WATTS; A Watts Water Technologies Company.
b. Zurn Industries, LLC.
c. Josam Company.

2. Standard: ASME A112.6.1M.
3. Description: Waste-fitting assembly, as required to match drainage piping material and arrangement with faceplates, couplings gaskets, and feet; bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before water-closet installation.

B. Examine walls and floors for suitable conditions where water closets will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Water-Closet Installation:

1. Install level and plumb according to roughing-in drawings.
2. Install floor-mounted water closets on bowl-to-drain connecting fitting attachments to piping or building substrate.
3. Install accessible, wall-mounted water closets at mounting height for handicapped/elderly, according to ICC/ANSI A117.1.

B. Support Installation:

1. Install supports, affixed to building substrate, for floor-mounted, back-outlet water closets.
2. Use carrier supports with waste-fitting assembly and seal.
3. Install floor-mounted, back-outlet water closets attached to building floor substrate, onto waste-fitting seals; and attach to support.
4. Install wall-mounted, back-outlet water-closet supports with waste-fitting assembly and waste-fitting seals; and affix to building substrate.

C. Flushometer-Valve Installation:

1. Install flushometer-valve, water-supply fitting on each supply to each water closet.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install actuators in locations that are easy for people with disabilities to reach.

D. Install toilet seats on water closets.

E. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

F. Joint Sealing:

1. Seal joints between water closets and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to water-closet color.
3. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 CONNECTIONS

A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

D. Where installing piping adjacent to water closets, allow space for service and maintenance.

3.4 ADJUSTING

A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.

B. Adjust water pressure at flushometer valves to produce proper flow.

C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.

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B. Install protective covering for installed water closets and fittings.

C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

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SECTION 224216.13 - COMMERCIAL LAVATORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Lavatories.
2. Shampoo bowls.
3. Faucets.
4. Supply fittings.
5. Waste fittings.
6. Supports.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for lavatories.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

PART 2 - PRODUCTS

2.1 VITREOUS-CHINA, WALL-MOUNTED LAVATORIES

A. Lavatory: Wheelchair, vitreous china, wall mounted.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Standard.
b. Kohler Co.
c. Zurn Industries, LLC.

2. Fixture:

a. Standard: ASME A112.19.2/CSA B45.1.

b. Type: Slab or wheelchair.
c. Nominal Size: Rectangular, 27 by 20 inches.
d. Faucet-Hole Punching: Three holes, 2-inch centers.
e. Faucet-Hole Location: Top.
f. Color: White.
g. Mounting: For concealed-arm carrier.

3. Support: Type II, concealed-arm lavatory carrier.
4. Lavatory Mounting Height: Handicapped/elderly according to ICC A117.1.

2.2 SHAMPOO BOWLS

A. Shampoo Bowls: Plastic.

1. Fixture:

a. Standard: ANSI Z124.3 or ANSI Z124.6.
b. Material: Plastic.
c. Bowl: Shaped for head rest.
d. Nominal Size: 19 by 19 by 10 inches.
e. Color: White.
f. Mounting Material: Wall bracket.

2. Faucet: Manufacturer's standard with vacuum breaker complying with ASME A112.18.3 and with hose spray head.
3. Waste Fittings: Comply with requirements in "Waste Fittings" Article except as follows:

a. Drain: Cup type with hair basket and NPS 1-1/2 tailpiece.
b. Trap Size: NPS 1-1/2.

2.3 SOLID-BRASS, MANUALLY OPERATED FAUCETS

A. NSF Standard: Comply with NSF 372 for faucet materials that will be in contact with potable water.

B. Lavatory Faucets: Manual-type, single-control mixing, commercial, solid-brass valve.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Standard.
b. Elkay.
c. Kohler Co.

2. Standard: ASME A112.18.1/CSA B125.1.
3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
4. Body Type: Single hole.
5. Body Material: Commercial, solid brass.

6. Finish: Polished chrome plate.
7. Maximum Flow Rate: 0.5 gpm at 60 psi.
8. Mounting Type: Deck, exposed.
9. Valve Handle(s): Single lever.
10. Spout: Swing type.

2.4 LAMINAR-FLOW, FAUCET-SPOUT OUTLETS

A. NSF Standard: Comply with NSF 372 for faucet-spout-outlet materials that will be in contact with potable water.

B. Description: Chrome-plated-brass, faucet-spout outlet that produces non-aerating, laminar stream. Include external or internal thread that mates with faucet outlet for attachment to faucets where indicated and flow-rate range that includes flow of faucet.

2.5 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF 372 for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless steel wall flange.

D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

2.6 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/4 offset and straight tailpiece.

C. Trap:

1. Size: NPS 1-1/4.
2. Material: Stainless steel, two-piece trap and swivel elbow with 0.012-inch- thick stainless steel tube to wall; and stainless steel wall flange.

2.7 SUPPORTS

A. Type II Lavatory Carrier:

1. Standard: ASME A112.6.1M.

B. Type III Lavatory Carrier:

1. Standard: ASME A112.6.1M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before lavatory installation.

B. Examine counters and walls for suitable conditions where lavatories will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install lavatories level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-mounted lavatories.

C. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people with disabilities or the elderly, according to ICC/ANSI A117.1.

D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

E. Seal joints between lavatories, counters, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

A. After completing installation of lavatories, inspect and repair damaged finishes.

B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed lavatories and fittings.

D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

END OF SECTION 224216.13

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SECTION 226213 - VACUUM PIPING FOR LABORATORY AND HEALTHCARE FACILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Laboratory vacuum piping, designated " laboratory vacuum."

1.3 DEFINITIONS

A. HVE: High-volume (oral) evacuation.

B. WAGD: Waste anesthetic gas disposal.

C. Vacuum Piping Systems: Include medical vacuum, WAGD, dental vacuum, HVE, and laboratory vacuum piping systems.

D. Laboratory Vacuum Piping Systems: Include laboratory low-vacuum and laboratory high-vacuum piping systems.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the vacuum piping testing indicated, that is an NRTL, and that is acceptable to authorities having jurisdiction.

B. Brazing: Qualify processes and operators in accordance with ASME Boiler and Pressure Vessel Code, Section IX, "Welding and Brazing Qualifications," or AWS B2.2/B2.2M.

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PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Laboratory vacuum operating at 12 in. Hg.

2.2 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 99.

2.3 PIPES, TUBES, AND FITTINGS

A. Comply with NFPA 99 for medical vacuum piping materials.

B. Copper Water Tube: ASTM B88, Type M, seamless, drawn temper.

C. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type that has been manufacturer cleaned, purged, and sealed for medical gas service or in accordance with CGA G-4.1 for oxygen service.

D. Copper Unions: ASME B16.22 or MSS SP-123, wrought-copper or cast-copper alloy.

E. Cast-Copper-Alloy Flanges: ASME B16.24, Class 150.

1. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, full-face type.
2. Flange Bolts and Nuts: ASME B18.2.1 carbon steel.

F. Shape-Memory-Metal Couplings:

1. Description: Cryogenic compression fitting made of nickel-titanium, shape-memory alloy, and that has been manufacturer cleaned, purged, and sealed for oxygen service in accordance with CGA G-4.1.

G. Pressure-Seal Fittings:

1. NPS 2 and Smaller: Wrought-copper fitting with EPDM O-ring seal in each end.
2. NPS 2-1/2 to NPS 4: Bronze fitting with stainless steel grip ring and EPDM O-ring seal in each end.

H. Extruded-Tee Outlets: ASTM F2014 procedure for making branch outlets in copper tube.

I. Flexible Pipe Connectors:

1. Description: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.

a. Working-Pressure Rating: 200 psig minimum.
b. End Connections: Plain-end copper tube.

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2.4 JOINING MATERIALS

A. Solder Filler Metals: ASTM B32, lead-free alloys. Include water-flushable flux in accordance with ASTM B813.

B. Brazing Filler Metals: AWS A5.8M/A5.8, BCuP Series, copper-phosphorus alloys.

C. Threaded-Joint Tape: PTFE.

2.5 VALVES

A. General Requirements for Valves: Manufacturer cleaned, purged, and bagged in accordance with CGA G-4.1 for oxygen service.

1. Exception: Factory cleaning and bagging are not required for valves for WAGD service.

B. Zone-Valve Box Assemblies: Box with medical gas valves, tube extensions, and gages.

1. Zone-Valve Boxes:

a. Steel Box with Aluminum Cover:

b. Steel Box with Stainless Steel Cover:

c. Description: Formed-steel box with cover, anchors for recessed mounting, holes with grommets in box sides for tubing extension protection, and of size for single or multiple valves with pressure gages and in sizes required to permit manual operation of valves.

1) Interior Finish: Factory-applied white enamel.
2) Cover Plate: stainless steel with frangible or removable windows.
3) Valve-Box Windows: Clear or tinted transparent plastic with labeling that includes rooms served, in accordance with NFPA 99.

C. Ball Valves:

1. Standard: MSS SP-110.
2. Description: Three-piece body, brass or bronze.
3. Pressure Rating: 300 psig minimum.
4. Ball: Full-port, chrome-plated brass.
5. Seats: PTFE or TFE.
6. Handle: Lever type with locking device.
7. Stem: Blowout proof with PTFE or TFE seal.
8. Ends: Manufacturer-installed ASTM B819, copper-tube extensions and manufacturer-installed ASTM B819, copper-tube extensions with pressure gauge on one copper-tube extension.

D. Check Valves:

1. Description: In-line pattern, bronze.
2. Pressure Rating: 300 psig minimum.

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3. Operation: Spring loaded.
4. Ends: Manufacturer-installed ASTM B819, copper-tube extensions.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. General Location and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of vacuum piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, vacuum producer sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Comply with NFPA 99 for installation of vacuum piping.

C. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

F. Install piping adjacent to equipment and specialties to allow service and maintenance.

G. Install piping with 1 percent slope downward in direction of flow.

H. Install nipples, unions, special fittings, and valves with pressure ratings same as or higher than piping pressure rating used in applications specified in "Piping Schedule" Article unless otherwise indicated.

I. Install eccentric reducers, if available, where vacuum piping is reduced in direction of flow, with bottoms of both pipes and reducer fitting flush.

J. Provide drain leg and drain trap at end of each main and branch and at low points.

K. Install piping to permit valve servicing.

L. Install piping free of sags and bends.

M. Install fittings for changes in direction and for branch connections. Extruded-tee branch outlets in copper tubing may be made where specified.

N. Install medical vacuum piping from medical vacuum service connections specified in this Section, to equipment specified in Section 226219 "Vacuum Equipment for Laboratory and Healthcare Facilities," and to equipment specified in other Sections requiring medical vacuum service.

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O. Piping Restraint Installation: Install seismic restraints on vacuum piping. Seismic-restraint devices are specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

P. Install vacuum service connections recessed in walls. Attach roughing-in assembly to substrate; attach finishing assembly to roughing-in assembly.

Q. Install vacuum bottle bracket adjacent to each wall-mounted medical vacuum service connection suction inlet.

R. Connect vacuum piping to vacuum producers and to equipment requiring vacuum service.

S. Install unions in copper vacuum tubing adjacent to each valve and at final connection to each machine, specialty, and piece of equipment.

T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

U. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.2 VALVE INSTALLATION

A. Install shutoff valve at each connection to and from vacuum equipment and specialties.

B. Install check valves to maintain correct direction of vacuum flow to vacuum-producing equipment.

C. Install valve boxes recessed in wall and anchored to substrate. Single boxes may be used for multiple valves that serve same area or function.

D. Install zone valves and gages in valve boxes. Rotate valves to angle that prevents closure of cover when valve is in closed position.

E. Install flexible pipe connectors in suction inlet piping to each vacuum producer.

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Apply appropriate tape to external pipe threads.

D. Brazed Joints: Join copper tube and fittings in accordance with CDA's "Copper Tube Handbook," Ch. "Brazed Joints." Do not use flux. Continuously purge joint with oil-free dry nitrogen during brazing.

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E. Soldered Joints: Apply ASTM B813, water-flushable flux to tube end. Join copper tube and fittings in accordance with ASTM B828.

F. Extruded-Tee Outlets: Form branches in copper tube in accordance with ASTM F2014, with tools recommended by tube manufacturer.

G. Flanged Joints:

1. Copper Tubing: Install flange on copper tubes. Use pipe-flange gasket between flanges. Join flanges with gasket and bolts in accordance with ASME B31.9 for bolting procedure.

H. Pressure-Sealed Joints: Join copper tube and copper and copper-alloy fittings with tools recommended by fitting manufacturer.

I. Shape-Memory-Metal Coupling Joints: Join new copper tube to existing tube according to procedures developed by fitting manufacturer for installation of shape-memory-metal coupling joints.

3.4 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for hangers, supports, and anchor devices specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

C. Vertical Piping: MSS Type 8 or Type 42, clamps.

D. Individual, Straight, Horizontal Piping Runs:

1. 100 Feet and Less: MSS Type 1, adjustable, steel, clevis hangers.
2. Longer Than 100 Feet: MSS Type 43, adjustable, roller hangers.

E. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44 pipe rolls. Support pipe rolls on trapeze. Comply with requirements in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment" for trapeze hangers.

F. Base of Vertical Piping: MSS Type 52 spring hangers.

G. Install hangers for copper tubing with maximum horizontal spacing and minimum rod diameters to comply with MSS SP-58, NFPA 99, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

H. Support horizontal piping within 12 inches of each fitting and coupling.

I. Support vertical runs of copper tubing to comply with MSS SP-58, NFPA 99, locally enforced codes and authorities having jurisdiction requirements, whichever are most stringent.

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3.5 IDENTIFICATION

A. Install identifying labels and devices for laboratory vacuum piping, valves, and specialties. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment."

B. Install identifying labels and devices for medical vacuum piping systems in accordance with NFPA 99. Use the following or similar captions and color-coding for piping products where required by NFPA 99:

1. Laboratory Vacuum: Black boxed letters on white-and-black checkerboard background.

3.6 FIELD QUALITY CONTROL FOR LABORATORY FACILITY VACUUM PIPING

A. Perform tests and inspections with the assistance of a factory-authorized service representative.

B. Tests and Inspections:

1. Piping Leak Tests for Vacuum Piping: Test new and modified parts of existing piping. Cap and fill vacuum piping with oil-free, dry nitrogen. Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.

a. Test Pressure for Copper Tubing: 150 psig.

2. Repair leaks and retest until no leaks exist.
3. Inspect filters for proper operation.

C. Piping will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.7 PROTECTION

A. Protect tubing from damage.

B. Retain sealing plugs in tubing, fittings, and specialties until installation.

C. Clean tubing not properly sealed, and where sealing is damaged, in accordance with "Preparation" Article.

3.8 PIPING SCHEDULE

A. Connect new copper tubing to existing copper tubing with memory-metal couplings.

B. Flanges may be used where connection to flanged equipment is required.

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C. Laboratory Vacuum Piping: Use one of the following piping materials for each size range:

1. NPS 4 and Smaller: Copper medical gas tube, wrought-copper fittings, and brazed joints.
2. NPS 4 and Smaller: Copper medical gas tube, press-type fittings, and pressure-sealed joints.
3. All Sizes: Extruded-tee fittings and brazed joints may be used instead of standard tee fittings.

3.9 VALVE SCHEDULE

A. Shutoff Valves:

1. Copper Tubing: Copper-alloy ball valve with manufacturer-installed ASTM B819, copper-tube extensions.

B. Zone Valves: Copper-alloy ball valve with manufacturer-installed ASTM B819, copper-tube extensions with pressure gage on one copper-tube extension.

END OF SECTION 226213

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SECTION 226313 - GAS PIPING FOR LABORATORY FACILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Helium piping designated “laboratory helium”.
2. Oxygen piping designated “laboratory oxygen”.
3. Ball valves.
4. Check valves.
5. Gas safety valves.
6. Gas-service connections.
7. Ceiling columns.
8. Gas manifolds.
9. Simplex specialty gas manifolds.
10. Duplex specialty gas manifolds.
11. Bulk gas storage tanks.
12. Gas cylinder storage racks.

1.3 DEFINITIONS

A. CR: Chlorosulfonated polyethylene synthetic rubber.

B. Laboratory gas piping systems include, helium, and oxygen for laboratories.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Source Quality Control Reports:

1. Certificates of Shop Inspection and Data Report for Bulk Gas Storage Tanks: As required by ASME Boiler and Pressure Vessel Code.

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PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. laboratory helium operating at 50 to 55 psig.

B. laboratory oxygen operating at 50 to 55 psig.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Ensure gas manifolds and bulk gas storage tanks withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.

1. The term "withstand" means "the gas manifolds and bulk gas storage tanks will remain in place without separation of any parts when subjected to the seismic forces specified and the manifolds and tanks will be fully operational after the seismic event."
2. Component Importance Factor is 1.5.

B. Comply with NFPA 55.

C. Comply with NFPA 99.

2.3 PIPES, TUBES, AND FITTINGS

A. For all laboratory gases, verify all positive-pressure laboratory gas piping, tubing, and fittings have been manufacturer cleaned, purged, and sealed for oxygen service, in accordance with CGA G-4.1.

1. Deliver each length of tubing plugged or capped by the manufacturer and kept sealed until prepared for installation.
2. Deliver fittings and other components manufacturer sealed and labeled, and kept sealed until prepared for installation.

B. Copper Laboratory Gas Tube: ASTM B819, Type K and Type L, seamless, drawn temper. Include standard color marking "OXY," "MED," "OXY/MED," "OXY/ACR," or "ACR/MED" in green for Type K tube and blue for Type L tube.

C. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type.

D. Copper Unions: ASME B16.22 or MSS SP-123, wrought-copper or cast-copper alloy.

E. Cast-Copper-Alloy Flanges: ASME B16.24, Class 150.

1. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, full-face type.
2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel.

F. Shape-Memory-Metal Couplings:

1. Description: Cryogenic compression fitting made of nickel-titanium, shape-memory alloy.

2.4 JOINING MATERIALS

A. Brazing Filler Metals: AWS A5.8M/A5.8, BCuP Series, copper-phosphorus alloys.

B. Threaded-Joint Tape: PTFE.

2.5 VALVES

A. General Requirements for Valves: Manufacturer cleaned, purged, and bagged in accordance with CGA G-4.1 for oxygen service.

B. Zone-Valve Box Assemblies: Box with medical gas valves, tube extensions, and gauges.

1. Steel Box with Stainless Steel Cover:

a. Description: Formed-steel box with cover, anchors for recessed mounting, holes with grommets in box sides for tubing extension protection, and of size for single or multiple valves with pressure gauges and in sizes required to permit manual operation of valves.

1) Interior Finish: Factory-applied white enamel.
2) Cover Plate: Stainless steel with frangible or removable windows.
3) Valve-Box Windows: Clear or tinted transparent plastic with labeling that includes rooms served, in accordance with NFPA 99.

b. Verify positive-pressure gas valves, for all medical gas types, are manufacturer cleaned, purged, and sealed for oxygen service, in accordance with CGA G-4.1.

1) Deliver valves sealed and labeled and kept sealed until prepared for installation.

C. Ball Valves:

1. Standard: MSS SP-110.
2. Description: Three-piece body, brass or bronze.
3. Pressure Rating: 300 psig minimum.
4. Ball: Full-port, chrome-plated brass.
5. Seats: PTFE or TFE.
6. Handle: Lever type with locking device.
7. Stem: Blowout proof with PTFE or TFE seal.
8. Ends: Manufacturer-installed ASTM B819, copper-tube extensions and manufacturer-installed ASTM B819, copper-tube extensions with pressure gauge on one copper-tube extension.
9. Verify positive-pressure gas valves, for all medical gas types, are manufacturer cleaned, purged, and sealed for oxygen service, in accordance with CGA G-4.1.

a. Deliver valves sealed and labeled and kept sealed until prepared for installation.

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D. Check Valves:

1. Description: In-line pattern, bronze.
2. Pressure Rating: 300 psig minimum.
3. Operation: Spring loaded.
4. Ends: Manufacturer-installed ASTM B 819, copper-tube extensions.
5. Verify positive-pressure gas valves, for all gas types, are manufacturer cleaned, purged, and sealed for oxygen service, in accordance with CGA G-4.1.

    a. Deliver valves sealed and labeled and kept sealed until prepared for installation.

E. Emergency Oxygen Connections: Low-pressure oxygen inlet assembly for connection to building oxygen piping systems.

1. Enclosure: Weatherproof hinged locking cover with caption similar to "Emergency Low-Pressure Gaseous Oxygen Inlet."
2. Inlet: Manufacturer-installed, NPS 1 or NPS 1-1/4, ASTM B819, copper tubing with NPS 1 minimum ball valve.
3. Safety Valve: Bronze-body pressure-relief valve set at 75 or 80 psig.
4. Instrumentation: Pressure gauge.
5. Verify positive-pressure gas valves, for all gas types, are manufacturer cleaned, purged, and sealed for oxygen service, in accordance with CGA G-4.1.

    a. Deliver valves sealed and labeled and kept sealed until prepared for installation.

F. Gas Safety Valves:

1. Bronze body.
2. ASME-construction, poppet, pressure-relief type.
3. Settings to match system requirements.
4. Verify positive-pressure gas valves, for all gas types, are manufacturer cleaned, purged, and sealed for oxygen service, in accordance with CGA G-4.1.

    a. Deliver valves sealed and labeled and kept sealed until prepared for installation.

G. Pressure Regulators:

1. Stainless steel body and trim.
2. Spring-loaded, diaphragm-operated, relieving type.
3. Manual pressure-setting adjustment.
4. Rated for 250-psig minimum inlet pressure.
5. Capable of controlling delivered gas pressure within 0.5 psig for each 10-psig inlet pressure.

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6. Verify positive pressure gas valves, for all gas types, are manufacturer cleaned, purged, and sealed for oxygen service, in accordance with CGA G-4.1.

   a. Deliver valves sealed and labeled and kept sealed until prepared for installation.

2.6 GAS SERVICE CONNECTIONS

A. General Requirements for Laboratory Gas-Service Connections:

1. Verify all positive-pressure gas-service connections, for all gas types, are manufacturer cleaned, purged, and sealed as for oxygen service in accordance with CGA G-4.1.
2. Suitable for specific gas pressure and suction service listed.
3. Include roughing-in assemblies, finishing assemblies, and cover plates.
4. Recessed-type units made for concealed piping unless otherwise indicated.

B. Roughing-in Assembly:

1. Steel outlet box for recessed mounting and concealed piping.
2. Brass-body outlet block with secondary check valve that will prevent gas flow when primary valve is removed.
3. Double seals that will prevent gas leakage.
4. ASTM B819, NPS 3/8 copper outlet tube brazed to valve with service marking and tube-end dust cap.

C. Finishing Assembly:

1. Brass housing with primary check valve.
2. Double seals that will prevent gas leakage.
3. Cover plate with gas-service label.

D. Quick-Coupler Pressure Service Connections: Outlets for oxygen with noninterchangeable keyed indexing to prevent interchange between services, constructed to permit one-handed connection and removal of equipment, and with positive-locking ring that retains equipment stem in valve during use.

E. Cover Plates: One piece, stainless steel and permanent, color-coded, identifying label matching corresponding service.

2.7 GAS MANIFOLDS

A. Manufacturer cleaned, purged, and sealed, for all medical gas type, for oxygen service in accordance with CGA G-4.1.

B. Comply with NFPA 99 for high-pressure medical gas cylinders.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

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D. Central Control-Panel Unit:

1. Weatherproof cabinet.
2. Supply and delivery pressure gauges.
3. Electrical alarm-system connections and transformer.
4. Indicator lights or devices.
5. Manifold connection.
6. Pressure changeover switch.
7. Line-pressure regulator.
8. Shutoff valves.
9. Safety valve.

E. Manifold and Headers:

1. Duplex, nonferrous-metal header for number of cylinders indicated, divided into two equal banks.
2. Designed for 2000-psig minimum inlet pressure, except nitrous oxide manifolds may be designed for 800 psig, and carbon dioxide manifolds may be designed for 1500 psig.
3. Cylinder-bank headers with inlet (pigtail) connections complying with CGA V-1.
4. Individual inlet check valves, shutoff valve, pressure regulator, check valve, and pressure gauge.

F. Operation: Automatic, pressure-switch-activated changeover from one-cylinder bank to the other when first bank becomes exhausted, without line-pressure fluctuation or resetting of regulators and without supply interruption by shutoff of either cylinder-bank header.

G. Mounting: Wall with mounting brackets for manifold control cabinet and headers or floor with support legs for manifold control cabinet.

H. Label manifold control unit with permanent label identifying medical gas type and system operating pressure.

I. Laboratory Helium Manifolds: For four cylinders and 55-psig line pressure.

J. Laboratory Oxygen Manifolds: For 12 cylinders and 55-psig line pressure.

2.8 SIMPLEX SPECIALTY GAS MANIFOLDS

A. Manufacturer cleaned, purged, and sealed, for all medical gas type, for oxygen service in accordance with CGA G-4.1.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Control-Panel Unit: Weatherproof cabinet, supply and delivery pressure gauges, electrical alarm-system connections and transformer, indicator lights or devices, manifold connection, line-pressure regulator, shutoff valves, and safety valve.

D. Manifold and Header: Nonferrous-metal header for number of cylinders indicated. Units include design for 2000-psig minimum inlet pressure, cylinder-bank header with inlet (pigtail)

connections complying with CGA V-1, individual inlet check valves, shutoff valve, pressure regulator, check valve, and pressure gauge.

E. Mounting: Wall with mounting brackets for manifold control cabinet and header or floor with support legs for manifold control cabinet.

F. Label manifold control unit with permanent label identifying specialty gas type and system operating pressure.

2.9 DUPLEX SPECIALTY GAS MANIFOLDS

A. Manufacturer cleaned, purged, and sealed, for all gas types, for oxygen service in accordance with CGA G-4.1.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Central Control-Panel Unit: Weatherproof cabinet, supply and delivery pressure gauges, electrical alarm-system connections and transformer, indicator lights or devices, manifold connection, line-pressure regulator, shutoff valves, and safety valve.

D. Manifold and Headers: Duplex, nonferrous-metal header for number of cylinders indicated, divided into two equal banks. Units include design for 2000-psig minimum inlet pressure, cylinder-bank headers with inlet (pigtail) connections complying with CGA V-1, individual inlet check valves, shutoff valve, pressure regulator, check valve, and pressure gauge.

E. Operation: Automatic, pressure-switch-activated changeover from one-cylinder bank to the other when first bank becomes exhausted, without line-pressure fluctuation or resetting of regulators and without supply interruption by shutoff of either cylinder-bank header.

F. Mounting: Wall with mounting brackets for manifold control cabinet and headers or floor with support legs for manifold control cabinet.

G. Label manifold control unit with permanent label identifying specialty gas type and system operating pressure.

2.10 GAS CYLINDER STORAGE RACKS

A. Wall Storage Racks: Fabricate racks with chain restraints for upright cylinders as indicated or provide equivalent manufactured wall racks.

B. Freestanding Storage Racks: Fabricate racks as indicated or provide equivalent manufactured storage racks.

C. Anchor holes in base to permit securing to the floor with anchor bolts supplied by the manufacturer.

D. Rack Support Tubing: Minimum 2-inch by 2-inch by 1/8-inch

E. Tank Restraints: Dual minimum 5/16-inch 1,900 pounds 5/16-inch 520 pounds.

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F. Comply with NFPA 55.

G. Comply with NFPA 99.

H. Comply with OSHPD #OPA-2878-10.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. General Location and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of gas piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Comply with NFPA 99 for installation of medical gas piping.

C. Comply with NFPA 55 for installation of laboratory gas piping.

D. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

G. Install piping adjacent to equipment and specialties to allow service and maintenance.

H. Install nipples, unions, special fittings, and valves with pressure ratings same as or higher than system pressure rating used in applications specified in "Piping Schedule" Article unless otherwise indicated.

I. Install piping to permit valve servicing.

J. Install piping free of sags and bends.

K. Install fittings for changes in direction and for branch connections.

L. Install medical gas piping to medical gas-service connections specified in this Section, to medical gas-service connections in equipment specified in this Section, and to equipment specified in other Sections requiring medical gas service.

M. Install exterior, buried medical gas piping in protective conduit fabricated with PVC pipe and fittings. Do not extend conduit through foundation wall.

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N. Piping Restraint Installation: Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

O. Install medical gas-service connections recessed in walls. Attach roughing-in assembly to substrate; attach finishing assembly to roughing-in assembly.

P. Connect gas piping to gas sources and to gas outlets and equipment requiring gas service.

Q. Install unions in copper tubing adjacent to each valve and at final connection to each specialty and piece of equipment.

R. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

S. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

T. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.2 VALVE INSTALLATION

A. Install shutoff valve at each connection to gas laboratory and healthcare equipment and specialties.

B. Install check valves to maintain correct direction of gas flow from laboratory and healthcare gas supplies.

C. Install valve boxes recessed in wall and anchored to substrate. Single boxes may be used for multiple valves that serve same area or function.

D. Install zone valves and gages in valve boxes. Arrange valves so largest valve is lowest. Rotate valves to angle that prevents closure of cover when valve is in closed position.

E. Install pressure regulators on gas piping where reduced pressure is required.

F. Install emergency oxygen connection with pressure-relief valve and full-size discharge piping to outside, with check valve downstream from pressure-relief valve, and with ball valve and check valve in supply main from bulk oxygen storage tank.

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from outside of cleaned tubing and fittings before assembly.

C. Threaded Joints: Apply appropriate tape to external pipe threads.

D. Brazed Joints: Join copper tube and fittings in accordance with CDA's "Copper Tube Handbook," Ch. "Brazed Joints." Do not use flux. Continuously purge joint with oil-free, dry nitrogen during brazing.

E. Shape-Memory-Metal Coupling Joints: Join new copper tube to existing tube according to procedures developed by fitting manufacturer for installation of shape-memory-metal coupling joints.

F. Soldered Joints: Apply ASTM B813, water-flushable flux to tube end. Join copper tube and fittings in accordance with ASTM B828.

G. Extruded-Tee Outlets: Form branches in copper tube in accordance with ASTM F2014, with tools recommended by tube manufacturer.

H. Flanged Joints:

1. Copper Tubing: Install flange on copper tubes. Use pipe-flange gasket between flanges. Join flanges with gasket and bolts in accordance with ASME B31.9 for bolting procedure.

3.4 GAS-SERVICE COMPONENT INSTALLATION

A. Assemble patient-service console with service connections. Install with supplies concealed in walls. Attach console box or mounting bracket to substrate.

B. Install nitrogen pressure-control panels in walls. Attach to substrate.

C. Assemble ceiling columns and install anchored to substrate. Provide structural steel, hanger rods, anchors, and fasteners in addition to components furnished with specialties necessary to fabricate supports.

D. Assemble ceiling-hose assemblies and install anchored to substrate. Provide structural steel, hanger rods, anchors, and fasteners in addition to components furnished with specialties necessary to fabricate supports.

E. Install gas manifolds anchored to substrate.

F. Install gas cylinders and connect to manifold piping.

G. Install gas manifolds with seismic restraints.

H. Install bulk gas storage tanks and reserve supply tanks level on concrete bases. Set tanks and connect gas piping to tanks in accordance with applicable requirements in NFPA 55 for bulk oxygen storage systems. Install tanks level and plumb, firmly anchored to concrete bases; maintain NFPA 55 and tank manufacturer's recommended clearances. Orient tanks so controls and devices are accessible for servicing.

I. Install bulk gas storage tanks and reserve supply tanks with seismic restraints.

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3.5 INSTALLATION OF HANGERs AND SUPPORTS

A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for hangers, supports, and anchor devices specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

C. Vertical Piping: MSS Type 8 or Type 42, clamps.

D. Individual, Straight, Horizontal Piping Runs:

1. 100 Feet and Less: MSS Type 1, adjustable, steel, clevis hangers.
2. Longer Than 100 Feet: MSS Type 43, adjustable, roller hangers.

E. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze. Comply with requirements in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment" for trapeze hangers.

F. Base of Vertical Piping: MSS Type 52, spring hangers.

G. Install hangers for copper tubing with maximum horizontal spacing and minimum rod diameters to comply with MSS SP-58, NFPA 99, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

H. Support horizontal piping within 12 inches of each fitting and coupling.

I. Support vertical runs of copper tubing to comply with MSS SP-58, NFPA 99, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

3.6 IDENTIFICATION

A. Install identifying labels and devices for specialty gas piping, valves, and specialties. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment."

B. Install identifying labels and devices for healthcare medical gas piping systems in accordance with NFPA 99. Use the following or similar captions and color-coding for piping products where required by NFPA 99:

1. Carbon Dioxide: Black or white letters on gray background.
2. Helium: White letters on brown background.
3. Nitrogen: White letters on black background.
4. Nitrous Oxide: White letters on blue background.
5. Oxygen: White letters on green background or green letters on white background.

3.7 FIELD QUALITY CONTROL FOR LABORATORY FACILITY SPECIALTY GAS

A. Perform tests and inspections with the assistance of a factory-authorized service representative.

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B. Tests and Inspections:

1. Piping Leak Tests for Specialty Gas Piping: Test new and modified parts of existing piping. Cap and fill specialty gas piping with oil-free, dry nitrogen to pressure of 50 psig above system operating pressure, but not less than 150 psig. Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.
2. Repair leaks and retest until no leaks exist.
3. Inspect specialty gas regulators for proper operation.

C. Piping will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.8 PROTECTION

A. Protect tubing from damage.

B. Retain sealing plugs in tubing, fittings, and specialties until installation.

C. Clean tubing not properly sealed, and where sealing is damaged, in accordance with "Preparation" Article.

3.9 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain bulk gas storage tanks.

3.10 PIPING SCHEDULE

A. Connect new tubing to existing tubing with memory-metal couplings.

B. Laboratory Gas Piping except Laboratory Nitrogen Piping NPS 3 185 psig: Type L, copper tube; wrought-copper fittings; and brazed joints.

C. Laboratory Nitrogen Piping NPS 3 185 psig: Type K, copper tube; wrought-copper fittings; and brazed joints.

3.11 VALVE SCHEDULE

A. Shutoff Valves: Ball valve with manufacturer-installed ASTM B819, copper-tube extensions.

B. Zone Valves: Ball valve with manufacturer-installed ASTM B819, copper-tube extensions with pressure gage on one copper-tube extension.

END OF SECTION 226313

Division 23

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SECTION 230513 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on alternating-current power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:

1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

A. Comply with NEMA MG 1 unless otherwise indicated.

B. Comply with IEEE 841 for severe-duty motors.

2.2 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.

B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: Premium efficient, as defined in NEMA MG 1.

C. Service Factor: 1.15.

D. Multispeed Motors: Variable torque.

1. For motors with 2:1 speed ratio, consequent pole, single winding.
2. For motors with other than 2:1 speed ratio, separate winding for each speed.

E. Multispeed Motors: Separate winding for each speed.

F. Rotor: Random-wound, squirrel cage.

G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.

H. Temperature Rise: Match insulation rating.

I. Insulation: Class F.

J. Code Letter Designation:

1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
2. Motors Smaller Than 15 HP: Manufacturer's standard starting characteristic.

K. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 ADDITIONAL REQUIREMENTS FOR POLYPHASE MOTORS

A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.

B. Motors Used with Variable-Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.

1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width-modulated inverters.
2. Premium-Efficient Motors: Class B temperature rise; Class F insulation.
3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
5. Provide grounding rings or straps on motors with variable frequency controller.

C. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.5 SINGLE-PHASE MOTORS

A. Verify motors larger than 1/20 hp are one of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.
2. Split phase.
3. Capacitor start, inductor run.
4. Capacitor start, capacitor run.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device automatically resets when motor temperature returns to normal range.

2.6 ELECTRONICALLY COMMUTATED MOTOR (ECM)

A. Provide pumps so they are specified or scheduled with ECM.

1. Synchronous, constant torque, ECM with permanent magnet rotor. Rotor magnets to be time-stable, nontoxic ceramic magnets (Sr-Fe).
2. Driven by a frequency converter with an integrated power factor correction filter. Conventional induction motors will not be acceptable.
3. Each motor with an integrated variable-frequency drive, tested as one unit by manufacturer.
4. Motor speed adjustable over full range from 0 rpm to maximum scheduled speed.
5. Variable motor speed to be controlled by a 0- to 10 V-dc or 4- to 20-mA input.
6. Integrated motor protection verified by UL to protect the pump against over-/undervoltage, overtemperature of motor and/or electronics, overcurrent, locked rotor, and dry run (no-load condition).

PART 3 - EXECUTION (NOT USED)

END OF SECTION 230513

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SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Duct labels.
4. Stencils.
5. Warning tags.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: stainless steel, 0.025-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Letter Color: White.
3. Background Color: Black.
4. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

5. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
6. Fasteners: Stainless steel rivets or self-tapping screws.
7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: Yellow.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.

G. Fasteners: Stainless steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information plus emergency notification instructions.

2.3 DUCT LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: White.

C. Background Color: Black.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater

viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.

G. Fasteners: Stainless steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings; also include duct size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions or as separate unit on each duct label to indicate flow direction.

2.4 WARNING TAGS

A. Description: Preprinted or partially preprinted accident-prevention tags of plasticized card stock with matte finish suitable for writing.

1. Size: Approximately 4 by 7 inches.
2. Fasteners: Reinforced grommet and wire or string.
3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Safety-yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

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3.4 DUCT LABEL INSTALLATION

A. Install self-adhesive duct labels with permanent adhesive on air ducts in the following color codes:

1. Blue: For cold-air supply ducts.
2. Green: For exhaust-, outside-, relief-, return-, and mixed-air ducts.

B. Locate labels near points where ducts enter into and exit from concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.5 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 230553

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SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Balancing Air Systems:

    a. Constant-volume air systems.
    b. Variable-air-volume systems.

2. Testing, Adjusting, and Balancing Equipment:

    a. Motors.

3. Testing, adjusting, and balancing existing systems and equipment.
4. Duct leakage tests.
5. Control system verification.

1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. BAS: Building automation systems.

C. NEBB: National Environmental Balancing Bureau.

D. TAB: Testing, adjusting, and balancing.

E. TABB: Testing, Adjusting, and Balancing Bureau.

F. TAB Specialist: An independent entity meeting qualifications to perform TAB work.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB specialist and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.

B. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.

C. Examination Report: Submit a summary report of the examination review required in "Examination" Article.

D. Certified TAB reports.

E. Sample report forms.

F. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.5 QUALITY ASSURANCE

A. TAB Specialists Qualifications: Certified by AABC.

1. TAB Field Supervisor: Employee of the TAB specialist and certified by AABC.
2. TAB Technician: Employee of the TAB specialist and certified by AABC as a TAB technician.

B. TAB Specialists Qualifications: Certified by NEBB or TABB.

1. TAB Field Supervisor: Employee of the TAB specialist and certified by NEBB or TABB.
2. TAB Technician: Employee of the TAB specialist and certified by NEBB or TABB as a TAB technician.

1.6 FIELD CONDITIONS

A. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.

B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.

F. Examine equipment performance data including fan and pump curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

H. Examine test reports specified in individual system and equipment Sections.

I. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.

J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible, and their controls are connected and functioning.

K. Examine strainers. Verify that startup screens have been replaced by permanent screens with indicated perforations.

L. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

M. Examine operating safety interlocks and controls on HVAC equipment.

N. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Prepare a TAB plan that includes the following:

1. Equipment and systems to be tested.
2. Strategies and step-by-step procedures for balancing the systems.
3. Instrumentation to be used.
4. Sample forms with specific identification for all equipment.

B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:

1. Airside:

a. Verify that leakage and pressure tests on air distribution systems have been satisfactorily completed.
b. Duct systems are complete with terminals installed.
c. Volume, smoke, and fire dampers are open and functional.
d. Clean filters are installed.
e. Fans are operating, free of vibration, and rotating in correct direction.
f. Variable-frequency controllers' startup is complete, and safeties are verified.
g. Automatic temperature-control systems are operational.
h. Ceilings are installed.
i. Windows and doors are installed.
j. Suitable access to balancing devices and equipment is provided.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and in this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. For variable-air-volume systems, develop a plan to simulate diversity.

D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

G. Verify that motor starters are equipped with properly sized thermal protection.

H. Check dampers for proper position to achieve desired airflow path.

I. Check for airflow blockages.

J. Check condensate drains for proper connections and functioning.

K. Check for proper sealing of air-handling-unit components.

L. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Measure total airflow.

    a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
    b. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
    c. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
    d. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.

2. Measure fan static pressures as follows:

    a. Measure static pressure directly at the fan outlet or through the flexible connection.
    b. Measure static pressure directly at the fan inlet or through the flexible connection.
    c. Measure static pressure across each component that makes up the air-handling system.

d. Report artificial loading of filters at the time static pressures are measured.

3. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
4. Obtain approval from Engineer for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
5. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload occurs. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows.

1. Measure airflow of submain and branch ducts.
2. Adjust submain and branch duct volume dampers for specified airflow.
3. Re-measure each submain and branch duct after all have been adjusted.

C. Adjust air inlets and outlets for each space to indicated airflows.

1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
2. Measure inlets and outlets airflow.
3. Adjust each inlet and outlet for specified airflow.
4. Re-measure each inlet and outlet after they have been adjusted.

D. Verify final system conditions.

1. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to design if necessary.
2. Re-measure and confirm that total airflow is within design.
3. Re-measure all final fan operating data, rpms, volts, amps, and static profile.
4. Mark all final settings.
5. Test system in economizer mode. Verify proper operation and adjust if necessary.
6. Measure and record all operating data.
7. Record final fan-performance data.

3.6 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

A. Adjust the variable-air-volume systems as follows:

1. Verify that the system static pressure sensor is located two-thirds of the distance down the duct from the fan discharge.
2. Verify that the system is under static pressure control.
3. Select the terminal unit that is most critical to the supply-fan airflow. Measure inlet static pressure and adjust system static pressure control set point so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's

recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.

4. Calibrate and balance each terminal unit for maximum and minimum design airflow as follows:

    a. Adjust controls so that terminal is calling for maximum airflow. Some controllers require starting with minimum airflow. Verify calibration procedure for specific project.
    b. Measure airflow and adjust calibration factor as required for design maximum airflow. Record calibration factor.
    c. When maximum airflow is correct, balance the air outlets downstream from terminal units.
    d. Adjust controls so that terminal is calling for minimum airflow.
    e. Measure airflow and adjust calibration factor as required for design minimum airflow. Record calibration factor. If no minimum calibration is available, note any deviation from design airflow.
    f. When in full cooling or full heating, ensure that there is no mixing of hot-deck and cold-deck airstreams unless so designed.
    g. On constant volume terminals, in critical areas where room pressure is to be maintained, verify that the airflow remains constant over the full range of full cooling to full heating. Note any deviation from design airflow or room pressure.

5. After terminals have been calibrated and balanced, test and adjust system for total airflow. Adjust fans to deliver total design airflows within the maximum allowable fan speed listed by fan manufacturer.

    a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
    b. Set terminals for maximum airflow. If system design includes diversity, adjust terminals for maximum and minimum airflow so that connected total matches fan selection and simulates actual load in the building.
    c. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
    d. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
    e. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.

6. Measure fan static pressures as follows:

    a. Measure static pressure directly at the fan outlet or through the flexible connection.
    b. Measure static pressure directly at the fan inlet or through the flexible connection.
    c. Measure static pressure across each component that makes up the air-handling system.
    d. Report any artificial loading of filters at the time static pressures are measured.

7. Set final return and outside airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.

    a. Balance the return-air ducts and inlets the same as described for constant-volume air systems.

b. Verify that terminal units are meeting design airflow under system maximum flow.

8. Re-measure the inlet static pressure at the most critical terminal unit and adjust the system static pressure set point to the most energy-efficient set point to maintain the optimum system static pressure. Record set point and give to controls contractor.
9. Verify final system conditions as follows:

    a. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to match design if necessary.
    b. Re-measure and confirm that total airflow is within design.
    c. Re-measure final fan operating data, rpms, volts, amps, and static profile.
    d. Mark final settings.
    e. Test system in economizer mode. Verify proper operation and adjust if necessary. Measure and record all operating data.
    f. Verify tracking between supply and return fans.

3.7 PROCEDURES FOR MOTORS

A. Motors 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Phase and hertz.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter size and thermal-protection-element rating.
8. Service factor and frame size.

B. Motors Driven by Variable-Frequency Controllers: Test manual bypass of controller to prove proper operation.

3.8 DUCT LEAKAGE TESTS

A. Witness the duct pressure testing performed by Installer.

B. Verify that proper test methods are used and that leakage rates are within specified tolerances.

C. Report deficiencies observed.

3.9 CONTROLS VERIFICATION

A. In conjunction with system balancing, perform the following:

1. Verify temperature control system is operating within the design limitations.
2. Confirm that the sequences of operation are in compliance with Contract Documents.
3. Verify that controllers are calibrated and function as intended.
4. Verify that controller set points are as indicated.
5. Verify the operation of lockout or interlock systems.

6. Verify the operation of valve and damper actuators.
7. Verify that controlled devices are properly installed and connected to correct controller.
8. Verify that controlled devices travel freely and are in position indicated by controller: open, closed, or modulating.
9. Verify location and installation of sensors to ensure that they sense only intended temperature, humidity, or pressure.

B. Reporting: Include a summary of verifications performed, remaining deficiencies, and variations from indicated conditions.

3.10 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.

1. Measure and record the operating speed, airflow, and static pressure of each fan.
2. Measure motor voltage and amperage. Compare the values to motor nameplate information.
3. Check the refrigerant charge.
4. Check the condition of filters.
5. Check the condition of coils.
6. Check the operation of the drain pan and condensate-drain trap.
7. Check bearings and other lubricated parts for proper lubrication.
8. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.

B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Verify the following:

1. New filters are installed.
2. Coils are clean, and fins combed.
3. Drain pans are clean.
4. Fans are clean.
5. Bearings and other parts are properly lubricated.
6. Deficiencies noted in the preconstruction report are corrected.

C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.

1. Compare the indicated airflow of the renovated work to the measured fan airflows and determine the new fan speed and the face velocity of filters and coils.
2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
3. If calculations increase or decrease the airflow rates and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.
4. Balance each air outlet.

3.11 TOLERANCES

A. Set HVAC system's airflow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
2. Air Outlets and Inlets: Plus or minus 10 percent.

B. Maintaining pressure relationships as designed have priority over the tolerances specified above.

3.12 PROGRESS REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems balancing devices. Recommend changes and additions to systems balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

3.13 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.
3. Certify validity and accuracy of field data.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Fan curves.
2. Manufacturers' test data.
3. Field test reports prepared by system and equipment installers.
4. Other information relative to equipment performance; do not include Shop Drawings and Product Data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.
3. Project name.
4. Project location.
5. Engineer's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.

10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.
15. Test conditions for fans and pump performance forms including the following:

    a. Settings for outdoor-, return-, and exhaust-air dampers.
    b. Conditions of filters.
    c. Cooling coil, wet- and dry-bulb conditions.
    d. Face and bypass damper settings at coils.
    e. Fan drive settings including settings and percentage of maximum pitch diameter.
    f. Inlet vane settings for variable-air-volume systems.
    g. Settings for supply-air, static-pressure controller.
    h. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data:

    a. Unit identification.
    b. Location.
    c. Make and type.
    d. Model number and unit size.
    e. Manufacturer's serial number.
    f. Unit arrangement and class.
    g. Discharge arrangement.
    h. Sheave make, size in inches, and bore.
    i. Center-to-center dimensions of sheave and amount of adjustments in inches.
    j. Number, make, and size of belts.
    k. Number, type, and size of filters.

2. Motor Data:

    a. Motor make and frame type and size.
    b. Horsepower and rpm.
    c. Volts, phase, and hertz.
    d. Full-load amperage and service factor.
    e. Sheave make, size in inches, and bore.
    f. Center-to-center dimensions of sheave and amount of adjustments in inches.

3. Test Data (Indicated and Actual Values):

    a. Total airflow rate in cfm.
    b. Total system static pressure in inches wg.
    c. Fan rpm.
    d. Discharge static pressure in inches wg.
    e. Filter static-pressure differential in inches wg.
    f. Preheat-coil static-pressure differential in inches wg.
    g. Cooling-coil static-pressure differential in inches wg.
    h. Heating-coil static-pressure differential in inches wg.
    i. Outdoor airflow in cfm.
    j. Return airflow in cfm.
    k. Outdoor-air damper position.
    l. Return-air damper position.
    m. Vortex damper position.

F. Apparatus-Coil Test Reports:

1. Coil Data:

    a. System identification.
    b. Location.
    c. Coil type.
    d. Number of rows.
    e. Fin spacing in fins per inch o.c.
    f. Make and model number.
    g. Face area in sq. ft..
    h. Tube size in NPS.
    i. Tube and fin materials.
    j. Circuiting arrangement.

2. Test Data (Indicated and Actual Values):

    a. Airflow rate in cfm.
    b. Average face velocity in fpm.
    c. Air pressure drop in inches wg.
    d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
    e. Return-air, wet- and dry-bulb temperatures in deg F.
    f. Entering-air, wet- and dry-bulb temperatures in deg F.
    g. Leaving-air, wet- and dry-bulb temperatures in deg F.
    h. Water flow rate in gpm.
    i. Water pressure differential in feet of head or psig.

j. Entering-water temperature in deg F.
k. Leaving-water temperature in deg F.
l. Refrigerant expansion valve and refrigerant types.
m. Refrigerant suction pressure in psig.
n. Refrigerant suction temperature in deg F.
o. Inlet steam pressure in psig.

G. Electric-Coil Test Reports: For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:

1. Unit Data:

a. System identification.
b. Location.
c. Coil identification.
d. Capacity in Btu/h.
e. Number of stages.
f. Connected volts, phase, and hertz.
g. Rated amperage.
h. Airflow rate in cfm.
i. Face area in sq. ft..
j. Minimum face velocity in fpm.

2. Test Data (Indicated and Actual Values):

a. Heat output in Btu/h.
b. Airflow rate in cfm.
c. Air velocity in fpm.
d. Entering-air temperature in deg F.
e. Leaving-air temperature in deg F.
f. Voltage at each connection.
g. Amperage for each phase.

H. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and size.
e. Manufacturer's serial number.
f. Arrangement and class.
g. Sheave make, size in inches, and bore.
h. Center-to-center dimensions of sheave and amount of adjustments in inches.

2. Motor Data:

a. Motor make and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.

d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Center-to-center dimensions of sheave and amount of adjustments in inches.
g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Suction static pressure in inches wg.

I. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

a. System and air-handling-unit number.
b. Location and zone.
c. Traverse air temperature in deg F.
d. Duct static pressure in inches wg.
e. Duct size in inches.
f. Duct area in sq. ft..
g. Indicated airflow rate in cfm.
h. Indicated velocity in fpm.
i. Actual airflow rate in cfm.
j. Actual average velocity in fpm.
k. Barometric pressure in psig.

J. Air-Terminal-Device Reports:

1. Unit Data:

a. System and air-handling unit identification.
b. Location and zone.
c. Apparatus used for test.
d. Area served.
e. Make.
f. Number from system diagram.
g. Type and model number.
h. Size.
i. Effective area in sq. ft..

2. Test Data (Indicated and Actual Values):

a. Airflow rate in cfm.
b. Air velocity in fpm.
c. Preliminary airflow rate as needed in cfm.
d. Preliminary velocity as needed in fpm.
e. Final airflow rate in cfm.

f. Final velocity in fpm.
g. Space temperature in deg F.

K. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:

1. Unit Data:

a. System and air-handling-unit identification.
b. Location and zone.
c. Room or riser served.
d. Coil make and size.
e. Flowmeter type.

2. Test Data (Indicated and Actual Values):

a. Airflow rate in cfm.
b. Entering-water temperature in deg F.
c. Leaving-water temperature in deg F.
d. Water pressure drop in feet of head or psig.
e. Entering-air temperature in deg F.
f. Leaving-air temperature in deg F.

3.14 VERIFICATION OF TAB REPORT

A. The TAB specialist's test and balance engineer conduct the inspection in the presence of Engineer.

B. Engineer randomly selects measurements, documented in the final report, to be rechecked. Rechecking limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.

C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, note the measurements as "FAILED."

D. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, consider the testing and balancing incomplete and rejected.

E. If TAB work fails, proceed as follows:

1. TAB specialists recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB specialist to complete TAB work according to the Contract Documents and deduct the cost of the services from the original TAB specialist's final payment.

F. Prepare test and inspection reports.

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3.15 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593

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SECTION 230713 - DUCT INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes insulating the following duct services:

1. Indoor, concealed supply and outdoor air.
2. Indoor, exposed supply and outdoor air.
3. Outdoor, exposed supply and return.

1.3 COORDINATION

A. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.4 SCHEDULING

A. Schedule insulation application after pressure testing systems. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
3. Detail application of field-applied jackets.
4. Detail application at linkages of control devices.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials are applied.

B. Verify products do not contain asbestos, lead, mercury, or mercury compounds.

C. Ensure products that come in contact with stainless steel have a leachable chloride content of less than 50 ppm when tested according to ASTM C871.

D. Verify insulation materials for use on austenitic stainless steel are qualified as acceptable according to ASTM C795.

E. Ensure foam insulation materials do not use CFC or HCFC blowing agents in the manufacturing process.

F. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C534, Type II for sheet materials.

G. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C553, Type II and ASTM C1290, Type III with factory-applied FSP jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

H. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 FIRE-RATED INSULATION SYSTEMS

A. Fire-Rated Board: Structural-grade, press-molded, xonolite calcium silicate, fireproofing board suitable for operating temperatures up to 1700 deg F. Comply with ASTM C656, Type II, Grade 6. Tested and certified to provide a 2-hour fire rating by an NRTL acceptable to authorities having jurisdiction.

B. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is tested and certified to provide a 2-hour fire rating by an NRTL acceptable to authorities having jurisdiction.

2.3 ADHESIVES

A. Ensure materials are compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

D. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

E. PVC Jacket Adhesive: Compatible with PVC jacket.

2.4 MASTICS AND COATINGS

A. Verify materials are compatible with insulation materials, jackets, and substrates.

B. Vapor-Retarder Mastic: Water based; suitable for indoor use on below ambient services.

1. Water-Vapor Permeance: Comply with ASTM C755, Section 7.2.2, Table 2, for insulation type and service conditions.
2. Service Temperature Range: Minus 20 to plus 180 deg F.
3. Comply with MIL-PRF-19565C, Type II, for permeance requirements.

C. Vapor-Retarder Mastic: Solvent based; suitable for indoor use on below ambient services.

1. Water-Vapor Permeance: Comply with ASTM C755, Section 7.2.2, Table 2, for insulation type and service conditions.
2. Service Temperature Range: 0 to 180 deg F.

D. Vapor-Retarder Mastic: Solvent based; suitable for outdoor use on below ambient services.

1. Water-Vapor Permeance: Comply with ASTM C755, Section 7.2.2, Table 2, for insulation type and service conditions.
2. Service Temperature Range: Minus 50 to plus 220 deg F.

E. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

1. Water-Vapor Permeance: ASTM E96, greater than 1.0 perm at manufacturer's recommended dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180 deg F.

2.5 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A and are to be compatible with insulation materials, jackets, and substrates.

1. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct insulation.
2. Service Temperature Range: 0 to plus 180 deg F.
3. Color: White.

2.6 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

1. Ensure materials are compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: Aluminum.

B. ASJ Flashing Sealants, and Vinyl and PVC Jacket Flashing Sealants:

1. Ensure materials are compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: White.

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C1136, Type II.
4. FSP Jacket: Aluminum-foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C1136, Type II.

2.8 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C921, Type I, unless otherwise indicated.

B. Metal Jacket:

1. Stainless-Steel Jacket: ASTM A167 or ASTM A240/A240M.

a. Sheet and roll stock ready for shop or field sizing.
b. Material, finish, and thickness are indicated in field-applied jacket schedules.
c. Moisture Barrier for Outdoor Applications: 3-mil thick, heat-bonded polyethylene and kraft paper.

2.9 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C1136.

1. Width: 3 inches.
2. Thickness: 11.5 mils.
3. Adhesion: 90 ounces force/inch in width.
4. Elongation: 2 percent.
5. Tensile Strength: 40 lbf/inch in width.
6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C1136.

1. Width: 3 inches.
2. Thickness: 6.5 mils.
3. Adhesion: 90 ounces force/inch in width.
4. Elongation: 2 percent.
5. Tensile Strength: 40 lbf/inch in width.
6. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Width: 2 inches.
2. Thickness: 3.7 mils.
3. Adhesion: 100 ounces force/inch in width.

4. Elongation: 5 percent.
5. Tensile Strength: 34 lbf/inch in width.

2.10 SECUREMENTS

A. Bands:

1. Stainless Steel: ASTM A167 or ASTM A240/A240M, Type 304 or Type 316; 0.015 inch thick, 3/4 inch wide with wing seal or closed seal.
2. Aluminum: ASTM B209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with wing seal or closed seal.
3. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Insulation Pins and Hangers:

1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- diameter shank, length to suit depth of insulation indicated.

2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.

3. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

    a. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
    b. Spindle: Stainless steel, fully annealed, 0.106-inch- diameter shank, length to suit depth of insulation indicated.
    c. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

4. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

    a. Baseplate: Perforated, nylon sheet, 0.030 inch thick by 1-1/2 inches in diameter.
    b. Spindle: Nylon, 0.106-inch- diameter shank, length to suit depth of insulation indicated, up to 2-1/2 inches.
    c. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

5. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

    a. Baseplate: Galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
    b. Spindle: Stainless steel, fully annealed, 0.106-inch- diameter shank, length to suit depth of insulation indicated.
    c. Adhesive-backed base with a peel-off protective cover.

6. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick, stainless steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

    a. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

7. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

C. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

D. Wire: 0.062-inch soft-annealed, stainless steel.

2.11 CORNER ANGLES

A. Stainless Steel Corner Angles: 0.024 inch thick, minimum 1 by 1 inch, stainless steel according to ASTM A167 or ASTM A240/A240M, Type 316.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces free of voids throughout the length of ducts and fittings.

B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Keep insulation materials dry during application and finishing.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.

    a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.

5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.

L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.

1. Comply with requirements in Section 078413 "Penetration Firestopping."

E. Insulation Installation at Floor Penetrations:

1. Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.6 INSTALLATION OF MINERAL-FIBER INSULATION

A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not overcompress insulation during installation.
    e. Impale insulation over pins and attach speed washers.
    f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

    a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops consist of vapor-barrier mastic applied in a Z-shaped pattern

over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.

5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not overcompress insulation during installation.
    e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

    a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.

5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.7 FIELD-APPLIED JACKET INSTALLATION

A. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.8 FIRE-RATED INSULATION SYSTEM INSTALLATION

A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.

B. Insulate duct access panels and doors to achieve same fire rating as duct.

C. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Section 078413 "Penetration Firestopping."

3.9 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect ductwork, randomly selected by Engineer, by removing field-applied jacket and insulation in layers in reverse order of their installation.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.10 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, concealed supply and outdoor air.
2. Indoor, exposed supply and outdoor air.
3. Indoor, concealed return located in unconditioned space.
4. Indoor, exposed return located in unconditioned space.
5. Outdoor, exposed supply and return.

B. Items Not Insulated:

1. Factory-insulated flexible ducts.
2. Factory-insulated plenums and casings.
3. Flexible connectors.
4. Vibration-control devices.
5. Factory-insulated access panels and doors.
6. Return air ductwork located in return air ceiling spaces above the area it serves, except where the return ductwork is installed in ceiling spaces with a roof above.

3.11 DUCT AND PLENUM INSULATION SCHEDULE

A. Duct and plenum insulation are one of the following:

1. Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density.
2. Mineral-Fiber Board: 2 inches thick and 3-lb/cu. ft. nominal density.

B. Provide duct insulation with a minimum R-value of R-8 based on insulation thickness only (excluding air films, vapor retarders, or other duct components) and tested C-values at 75 degrees F mean temperature at the installed thickness in accordance with ASTM C518 or ASTM C177.

END OF SECTION 230713

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SECTION 230923 - DIRECT DIGITAL CONTROL (DDC) SYSTEM FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. DDC system for monitoring and controlling of HVAC systems.
2. Delivery of selected control devices to equipment and systems manufacturers for factory installation and to HVAC systems installers for field installation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product include the following:

1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Operating characteristics, electrical characteristics, and furnished accessories indicating process operating range, accuracy over range, control signal over range, default control signal with loss of power, calibration data specific to each unique application, electrical power requirements, and limitations of ambient operating environment, including temperature and humidity.
3. Product description with complete technical data, performance curves, and product specification sheets.
4. Installation, operation and maintenance instructions including factors effecting performance.
5. Bill of materials of indicating quantity, manufacturer, and extended model number for each unique product.

    a. DDC controllers.
    b. Enclosures.
    c. Electrical power devices.
    d. Accessories.
    e. Instruments.
    f. Control dampers and actuators.

6. When manufacturer's product datasheets apply to a product series rather than a specific product model, clearly indicate and highlight only applicable information.
7. Each submitted piece of product literature shall clearly cross reference specification and drawings that submittal is to cover.

8. Schematic drawings for each controlled HVAC system indicating the following:

    a. I/O points labeled with point names shown. Indicate instrument range, normal operating set points, and alarm set points. Indicate fail position of each damper and valve, if included in Project.
    b. I/O listed in table format showing point name, type of device, manufacturer, model number, and cross-reference to product data sheet number.
    c. A graphic showing location of control I/O in proper relationship to HVAC system.
    d. Wiring diagram with each I/O point having a unique identification and indicating labels for all wiring terminals.
    e. Unique identification of each I/O that shall be consistently used between different drawings showing same point.
    f. Elementary wiring diagrams of controls for HVAC equipment motor circuits including interlocks, switches, relays and interface to DDC controllers.
    g. Narrative sequence of operation.
    h. Graphic sequence of operation, showing all inputs and output logical blocks.

9. Control panel drawings indicating the following:

    a. Panel dimensions, materials, size, and location of field cable, raceways, and tubing connections.
    b. Interior subpanel layout, drawn to scale and showing all internal components, cabling and wiring raceways, nameplates and allocated spare space.
    c. Front, rear, and side elevations and nameplate legend.
    d. Unique drawing for each panel.

10. DDC system electrical power riser diagram indicating the following:

    a. Each point of connection to field power with requirements (volts/phase/hertz/ amperes/connection type) listed for each.
    b. Each control power supply including, as applicable, transformers, power-line conditioners, transient voltage suppression and high filter noise units, DC power supplies, and UPS units with unique identification for each.
    c. Each product requiring power with requirements (volts/phase/hertz/amperes/ connection type) listed for each.
    d. Power wiring type and size, race type, and size for each.

11. Monitoring and control signal diagrams indicating the following:

    a. Control signal cable and wiring between controllers and I/O.
    b. Point-to-point schematic wiring diagrams for each product.

B. System Description:

1. Full description of DDC system architecture, network configuration, operator interfaces and peripherals, servers, controller types and applications, gateways, routers and other network devices, and power supplies.
2. Complete listing and description of each report, log and trend for format and timing and events which initiate generation.
3. System and product operation under each potential failure condition including, but not limited to, the following:

a. Loss of power.
b. Loss of controller signals to inputs and outpoints.
c. Operator workstation failure.
d. Controller failure.
e. Instrument failure.
f. Control damper and valve actuator failure.

4. Complete bibliography of documentation and media to be delivered to Owner.
5. Description of testing plans and procedures.
6. Description of Owner training.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For DDC system to include in emergency, operation and maintenance manuals.

1. Include the following:

a. Project Record Drawings of as-built versions of submittal Shop Drawings provided in electronic PDF format.
b. Testing and commissioning reports and checklists of completed final versions of reports, checklists, and trend logs.
c. As-built versions of submittal Product Data.
d. Names, addresses, e-mail addresses and 24-hour telephone numbers of Installer and service representatives for DDC system and products.
e. Operator's manual with procedures for operating control systems including logging on and off, handling alarms, producing point reports, trending data, overriding computer control and changing set points and variables.
f. Programming manuals with description of programming language and syntax, of statements for algorithms and calculations used, of point database creation and modification, of program creation and modification, and of editor use.
g. Engineering, installation, and maintenance manuals that explain how to:

1) Design and install new points, panels, and other hardware.
2) Perform preventive maintenance and calibration.
3) Debug hardware problems.
4) Repair or replace hardware.

h. Documentation of all programs created using custom programming language including set points, tuning parameters, and object database.
i. Backup copy of graphic files, programs, and database on electronic media such as DVDs.
j. List of recommended spare parts with part numbers and suppliers.
k. Complete original-issue documentation, installation, and maintenance information for furnished third-party hardware including computer equipment and sensors.
l. Complete original-issue copies of furnished software, including operating systems, custom programming language, operator workstation software, and graphics software.
m. Licenses, guarantees, and warranty documents.

n. Recommended preventive maintenance procedures for system components, including schedule of tasks such as inspection, cleaning, and calibration; time between tasks; and task descriptions.
o. Owner training materials.

1.5 QUALITY ASSURANCE

A. DDC System Manufacturer Qualifications:

1. Nationally recognized manufacturer of DDC systems and products.
2. DDC systems with similar requirements to those indicated for a continuous period of 10 years within time of bid.
3. DDC systems and products that have been successfully tested and in use on at least five past projects.
4. Having complete published catalog literature, installation, operation and maintenance manuals for all products intended for use.
5. Having full-time in-house employees for the following:

a. Product research and development.
b. Product and application engineering.
c. Product manufacturing, testing and quality control.
d. Technical support for DDC system installation training, commissioning and troubleshooting of installations.
e. Owner operator training.

B. DDC System Provider Qualifications:

1. Authorized representative of, and trained by, DDC system manufacturer.
2. Demonstrate experience with installation of DDC system products being installed for period within five consecutive years before time of bid.
3. Demonstrate experience on five projects of similar complexity, scope and value.
4. Each person assigned to Project shall have demonstrated past experience.
5. Staffing resources of competent and experienced full-time employees that are assigned to execute work according to schedule.
6. Service and maintenance staff assigned to support Project during warranty period.
7. Product parts inventory to support on-going DDC system operation for a period of not less than 5 years after Substantial Completion.
8. DDC system manufacturer's backing to take over execution of Work if necessary to comply with requirements indicated. Include Project-specific written letter, signed by manufacturer's corporate officer, if requested.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace products that fail in materials or workmanship within specified warranty period.

1. Adjust, repair, or replace failures at no additional cost or reduction in service to Owner.
2. Include updates or upgrades to software and firmware if necessary to resolve deficiencies.

a. Install updates only after receiving Owner's written authorization.

3. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 DDC SYSTEM MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:

1. Distech Controls.
2. Johnson Controls, Inc.
3. Trane.

2.2 DDC SYSTEM DESCRIPTION

A. Microprocessor-based monitoring and control including analog/digital conversion and program logic. A control loop or subsystem in which digital and analog information is received and processed by a microprocessor, and digital control signals are generated based on control algorithms and transmitted to field devices to achieve a set of predefined conditions.

1. DDC System: Consist of a peer-to-peer network of distributed DDC controllers, operator interfaces, and software.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Products installed in ducts, equipment, and return-air paths shall comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 50 or less.

B. DDC Data Access:

1. When logged into the system, operator shall be able to also interact with any DDC controller connected to DDC system as required for functional operation of DDC system.
2. System(s) shall be used for application configuration; for archiving, reporting and trending of data; for operator transaction archiving and reporting; for network information management; for alarm annunciation; and for operator interface tasks and controls application management.

C. Input Point Displayed Accuracy: Input point displayed values shall meet following end-to-end overall system accuracy, including errors associated with meter, sensor, transmitter, lead wire or cable, and analog to digital conversion.

1. Flow:

    a. Air: Within 2 percent of design flow rate.
    b. Air (Terminal Units): Within 5 percent of design flow rate.

2. Pressure:

    a. Air, Ducts and Equipment: 0.5 percent of instrument range.
    b. Space: Within 0.5 percent of instrument range.

3. Speed: Within 5 percent of reading.

4. Temperature, Dry Bulb:

    a. Air: Within 0.5-degree F.
    b. Space: Within 0.5-degree F.
    c. Outdoor: Within 1 degree F.
    d. Temperature Difference: Within 0.25-degree F.
    e. Other Temperatures Not Indicated: Within 0.5-degree F.

D. Precision of I/O Reported Values: Values reported in database and displayed shall have following precision:

1. Current:

    a. Milliamperes: Nearest 1/100th of a milliampere.
    b. Amperes: Nearest 1/10th of an ampere up to 100 A; nearest ampere for 100 A and more.

2. Flow:

    a. Air: Nearest 1/10th of a cfm through 100 cfm; nearest cfm between 100 and 1000 cfm; nearest 10 cfm between 1000 and 10,000 cfm; nearest 100 cfm above 10,000 cfm.

3. Speed:

    a. Rotation (rpm): Nearest 1 rpm.
    b. Velocity: Nearest 1/10th fpm through 100 fpm; nearest fpm between 100 and 1000 fpm; nearest 10 fpm above 1000 fpm.

4. Position, Dampers and Valves (Percentage Open): Nearest 1 percent.
5. Pressure:

    a. Air, Ducts and Equipment: Nearest 1/10th inch w.c..
    b. Space: Nearest 1/100th inch w.c..
    c. Steam: Nearest 1/10th psig through 100 psig; nearest psig above 100 psig.
    d. Water: Nearest 1/10 psig through 100 psig; nearest psig above 100 psig.

6. Temperature:

    a. Air, Ducts and Equipment: Nearest 1/10th of a degree.

b. Outdoor: Nearest degree.
c. Space: Nearest 1/10th of a degree.
d. Chilled Water: Nearest 1/10th of a degree.
e. Condenser Water: Nearest 1/10th of a degree.
f. Heating Hot Water: Nearest degree.
g. Heat Recovery Runaround: Nearest 1/10th of a degree.
h. Steam: Nearest degree.

7. Voltage: Nearest 1/10 volt up to 100 V; nearest volt above 100 V.

E. Control Stability: Control variables indicated within the following limits:

1. Flow:

a. Air, Ducts and Equipment, except Terminal Units: Within 2 percent of design flow rate.
b. Air, Terminal Units: Within 5 percent of design flow rate.

2. Pressure:

a. Air, Ducts and Equipment: 0.5 percent of instrument range.
b. Space: Within 0.5 percent of instrument range.

3. Temperature, Dry Bulb:

a. Air: Within 0.5 degrees F.
b. Space: Within 0.5 degrees F.

F. Electric Power Quality:

1. Power-Line Surges:

a. Protect DDC system products connected to ac power circuits from power-line surges to comply with requirements of IEEE C62.41.
b. Do not use fuses for surge protection.
c. Test protection in the normal mode and in the common mode, using the following two waveforms:

1) 10-by-1000-mic.sec. waveform with a peak voltage of 1,500 V and a peak current of 60 A.
2) 8-by-20-mic.sec. waveform with a peak voltage of 1,000 V and a peak current of 500 A.

2. Power Conditioning:

a. Protect DDC system products connected to ac power circuits from irregularities and noise rejection. Characteristics of power-line conditioner shall be as follows:

1) At 85 percent load, output voltage shall not deviate by more than plus or minus 1 percent of nominal when input voltage fluctuates between minus 20 percent to plus 10 percent of nominal.

2) During load changes from zero to full load, output voltage shall not deviate by more than plus or minus 3 percent of nominal.
3) Accomplish full correction of load switching disturbances within five cycles, and 95 percent correction within two cycles of onset of disturbance.
4) Total harmonic distortion shall not exceed 3-1/2 percent at full load.

3. Ground Fault: Protect products from ground fault by providing suitable grounding. Products shall not fail due to ground fault condition.

G. Backup Power Source:

1. HVAC systems and equipment served by a backup power source shall have associated DDC system products that control such systems and equipment also served from a backup power source.

H. Continuity of Operation after Electric Power Interruption:

1. Equipment and associated factory-installed controls, field-installed controls, electrical equipment, and power supply connected to building normal and backup power systems shall automatically return equipment and associated controls to operating state occurring immediately before loss of normal power, without need for manual intervention by operator when power is restored either through backup power source or through normal power if restored before backup power is brought online.

2.4 PANEL-MOUNTED, MANUAL OVERRIDE SWITCHES

A. Manual Override of Control Dampers:

1. Include panel-mounted, two-position, selector switch for each automatic control damper being controlled by DDC controller.
2. Label each switch with damper designation served by switch.
3. Label switch positions to indicate either "Manual" or "Auto" control signal to damper.
4. With switch in "Auto" position signal to control damper actuator shall be control loop output signal from DDC controller.
5. With switch in "Manual" position, signal to damper actuator shall be controlled at panel with either an integral or separate switch to include local control.

a. For Binary Control Dampers: Manual two-position switch shall have "Close" and "Open" switch positions indicated. With switch in "Close" position, damper shall close. With switch in "Open" position, damper shall open.
b. For Analog Control Dampers: A gradual switch shall have "Close" and "Open" switch limits indicated. Operator shall be able to rotate switch knob to adjust damper to any position from close to open.

6. DDC controller shall monitor and report position of each manual override selector switch. With switch placed in "manual" position, DDC controller shall signal an override condition to alert operator that damper is under manual, not automatic, control.
7. Configure manual override switches to allow operator to manually operate damper while at panel without DDC controller installed and operational.

8. Terminal equipment including VAV units, do not require manual override unless otherwise indicated by sequence of operation.

2.5 DDC SYSTEM OPERATOR INTERFACES

A. Operator Means of System Access: Operator shall be able to access entire DDC system through any of multiple means, including, but not limited to, the following:

1. Desktop and portable workstation with hardwired connection through LAN port.
2. Portable operator terminal with hardwired connection through LAN port.
3. Portable operator workstation with wireless connection through LAN router.
4. Mobile device and application with secured wireless connection through LAN router or cellular data service.
5. Remote connection through web access.

B. Access to system, regardless of operator means used, shall be transparent to operator.

C. Portable Workstations:

1. Connect to DDC system Level one LAN through a communications port directly on LAN or through a communications port on a DDC controller.
2. Able to communicate with any device located on any DDC system LAN.
3. Connect to system through a wireless router connected to Level one LAN.
4. Connect to system through a cellular data service.
5. Portable workstation shall be able to communicate with any device connected to any system LAN regardless of point of physical connection to system.
6. Monitor, program, schedule, adjust set points, and report capabilities of I/O connected anywhere in system.
7. Have dynamic graphic displays that are identical to desktop workstations.

D. Critical Alarm Reporting:

1. Operator-selected critical alarms shall be sent by DDC system to notify operator of critical alarms that require immediate attention.
2. DDC system shall send alarm notification to multiple recipients that are assigned for each alarm.
3. DDC system shall notify recipients by any or all means, including e-mail, text message and prerecorded phone message to mobile and landline phone numbers.

2.6 PORTABLE WORKSTATIONS

A. Description: A self-contained computer designed to allow for normal use in different locations and conditions.

B. Performance Requirements:

1. Performance requirements may dictate equipment exceeding minimum requirements indicated.
2. Energy Star compliant.

3. Hardware and software shall support local down-loading to DDC controllers.
4. Data transfer rate to DDC controller shall be at network speed.

2.7 PORTABLE OPERATOR TERMINAL

A. Description: Handheld device with integral keypad or touch screen operator interface.

B. Display: Multiple lines of text display for use in operator interaction with DDC system.

C. Cable: Flexible cable, at least 36 inches long, with a plug-in jack for connection to DDC controllers, network ports or instruments with an integral LAN port. As an alternative to hardwired connection, POT shall be accessible to DDC controllers through a wireless network connection.

D. POT shall be powered through network connection.

E. Connection of POT to DDC system shall not interrupt or interfere with normal network operation in any way, prevent alarms from being transmitted, or preclude central initiated commands and system modification.

F. POT shall give operator the ability to do the following:

1. Display and monitor BI point status.
2. Change BO point set point (on or off, open or closed).
3. Display and monitor analog point values.
4. Change analog control set points.
5. Command a setting of AO point.
6. Display and monitor I/O point in alarm.
7. Add a new or delete an existing I/O point.
8. Enable and disable I/O points, initiators, and programs.
9. Display and change time and date.
10. Display and change time schedules.
11. Display and change run-time counters and run-time limits.
12. Display and change time and event initiation.
13. Display and change control application and DDC parameters.
14. Display and change programmable offset values.
15. Access DDC controller initialization routines and diagnostics.

2.8 SYSTEM SOFTWARE

A. System Software Minimum Requirements:

1. Real-time multitasking and multiuser 64-bit operating system that allows concurrent multiple operator workstations operating and concurrent execution of multiple real-time programs and custom program development.
2. Operating system shall be capable of operating DOS and Microsoft Windows applications.
3. Database management software shall manage all data on an integrated and non-redundant basis. Additions and deletions to database shall be without detriment to existing data.

Include cross linkages so no data required by a program can be deleted by an operator until that data have been deleted from respective programs.

4. Network communications software shall manage and control multiple network communications to provide exchange of global information and execution of global programs.
5. Operator interface software shall include day-to-day operator transaction processing, alarm and report handling, operator privilege level and data segregation control, custom programming, and online data modification capability.
6. Scheduling software shall schedule centrally based time and event, temporary, and exception day programs.

B. Operator Interface Software:

1. Minimize operator training through use of English language prorating and English language point identification.
2. Minimize use of a typewriter-style keyboard through use of a pointing device similar to a mouse.
3. Operator sign-off shall be a manual operation or, if no keyboard or mouse activity takes place, an automatic sign-off.
4. Automatic sign-off period shall be programmable from one to 60 minutes in one-minute increments on a per operator basis.
5. Operator sign-on and sign-off activity shall be recorded and sent to printer.
6. Security Access:

    a. Operator access to DDC system shall be under password control.
    b. An alphanumeric password shall be field assignable to each operator.
    c. Operators shall be able to access DDC system by entry of proper password.
    d. Operator password shall be same regardless of which computer or other interface means is used.
    e. Additions or changes made to passwords shall be updated automatically.
    f. Each operator shall be assigned an access level to restrict access to data and functions the operator is cable of performing.
    g. Software shall have at least five access levels.
    h. Each menu item shall be assigned an access level so that a one-for-one correspondence between operator assigned access level(s) and menu item access level(s) is required to gain access to menu item.
    i. Display menu items to operator with those capable of access highlighted. Menu and operator access level assignments shall be online programmable and under password control.

7. Data Segregation:

    a. Include data segregation for control of specific data routed to a workstation, to an operator or to a specific output device, such as a printer.
    b. Include at least 32 segregation groups.
    c. Segregation groups shall be selectable such as "fire points," "fire points on second floor," "space temperature points," "HVAC points," and so on.
    d. Points shall be assignable to multiple segregation groups. Display and output of data to printer or monitor shall occur where there is a match of operator or peripheral segregation group assignment and point segregations.

e. Alarms shall be displayed and printed at each peripheral to which segregation allows, but only those operators assigned to peripheral and having proper authorization level will be allowed to acknowledge alarms.
f. Operators and peripherals shall be assignable to multiple segregation groups and all assignments are to be online programmable and under password control.

8. Operators shall be able to perform commands including, but not limited to, the following:

a. Start or stop selected equipment.
b. Adjust set points.
c. Add, modify, and delete time programming.
d. Enable and disable process execution.
e. Lock and unlock alarm reporting for each point.
f. Enable and disable totalization for each point.
g. Enable and disable trending for each point.
h. Override control loop set points.
i. Enter temporary override schedules.
j. Define holiday schedules.
k. Change time and date.
l. Enter and modify analog alarm limits.
m. Enter and modify analog warning limits.
n. View limits.
o. Enable and disable demand limiting.
p. Enable and disable duty cycle.
q. Display logic programming for each control sequence.

9. Reporting:

a. Generated automatically and manually.
b. Sent to displays, printers and disk files.
c. Types of Reporting:

1) General listing of points.
2) List points currently in alarm.
3) List of off-line points.
4) List points currently in override status.
5) List of disabled points.
6) List points currently locked out.
7) List of items defined in a "Follow-Up" file.
8) List weekly schedules.
9) List holiday programming.
10) List of limits and deadbands.

10. Summaries: For specific points, for a logical point group, for an operator selected group(s), or for entire system without restriction due to hardware configuration.

C. Graphic Interface Software:

1. Include a full interactive graphical selection means of accessing and displaying system data to operator. Include at least five levels with the penetration path operator assignable (for example, site, building, floor, air-handling unit, and supply temperature loop). Native

language descriptors assigned to menu items are to be operator defined and modifiable under password control.

2. Include a hierarchical-linked dynamic graphic operator interface for accessing and displaying system data and commanding and modifying equipment operation. Interface shall use a pointing device with pull-down or penetrating menus, color and animation to facilitate operator understanding of system.
3. Include at least 10 levels of graphic penetration with the hierarchy operator assignable.
4. Descriptors for graphics, points, alarms and such shall be modified through operator's workstation under password control.
5. Graphic displays shall be online user definable and modifiable using the hardware and software provided.
6. Data to be displayed within a graphic shall be assignable regardless of physical hardware address, communication or point type.
7. Graphics are to be online programmable and under password control.
8. Points may be assignable to multiple graphics where necessary to facilitate operator understanding of system operation.
9. Graphics shall also contain software points.
10. Penetration within a graphic hierarchy shall display each graphic name as graphics are selected to facilitate operator understanding.
11. Back-trace feature shall permit operator to move upward in the hierarchy using a pointing device. Back trace shall show all previous penetration levels. Include operator with option of showing each graphic full screen size with back trace as horizontal header or by showing a "stack" of graphics, each with a back trace.
12. Display operator accessed data on the monitor.
13. Operator shall select further penetration using pointing device to click on a site, building, floor, area, equipment, and so on. Defined and linked graphic below that selection shall then be displayed.
14. Include operator with means to directly access graphics without going through penetration path.
15. Dynamic data shall be assignable to graphics.
16. Display points (physical and software) with dynamic data provided by DDC system with appropriate text descriptors, status or value, and engineering unit.
17. Use color, rotation, or other highly visible means, to denote status and alarm states. Color shall be variable for each class of points, as chosen by operator.
18. Points shall be dynamic with operator adjustable update rates on a per point basis from one second to over a minute.
19. For operators with appropriate privilege, points shall be commanded directly from display using pointing device.

    a. For an analog command point such as set point, current conditions and limits shall be displayed and operator can position new set point using pointing device.
    b. For a digital command point such as valve position, valve shall show its current state such as open or closed and operator could select alternative position using pointing device.
    c. Keyboard equivalent shall be available for those operators with that preference.

20. Operator shall be able to split or resize viewing screen into quadrants to show one graphic on one quadrant of screen and other graphics or spreadsheet, bar chart, word processing, curve plot and other information on other quadrants on screen. This feature shall allow real-time monitoring of one part of system while displaying other parts of system or data to better facilitate overall system operation.

21. Help Features:

    a. On-line context-sensitive help utility to facilitate operator training and understanding.
    b. Bridge to further explanation of selected keywords. Document shall contain text and graphics to clarify system operation.

        1) If help feature does not have ability to bridge on keywords for more information, a complete set of user manuals shall be provided in an indexed word-processing program, which shall run concurrently with operating system software.

    c. Available for Every Menu Item:

        1) Index items for each system menu item.

22. Graphic generation software shall allow operator to add, modify, or delete system graphic displays.

    a. Include libraries of symbols depicting HVAC symbols such as fans, coils, filters, dampers, valves pumps, and electrical symbols.
    b. Graphic development package shall use a pointing device in conjunction with a drawing program to allow operator to perform the following:

        1) Define background screens.
        2) Define connecting lines and curves.
        3) Locate, orient and size descriptive text.
        4) Define and display colors for all elements.
        5) Establish correlation between symbols or text and associated system points or other displays.

D. Project-Specific Graphics: Graphics documentation including, but not limited to, the following:

1. Site plan showing each building, and additional site elements, which are being controlled or monitored by DDC system.
2. Plan for each building floor, including interstitial floors, and each roof level of each building, showing the following:

    a. Room layouts with room identification and name.
    b. Locations and identification of all monitored and controlled HVAC equipment and other equipment being monitored and controlled by DDC system.
    c. Location and identification of each hardware point being controlled or monitored by DDC system.

3. Control schematic for each of following, including a graphic system schematic representation with point identification, set point and dynamic value indication, sequence of operation and control logic diagram.
4. Graphic display for each piece of equipment connected to DDC system through a data communications link. Include dynamic indication of all points associated with equipment.

E. Customizing Software:

1. Software to modify and tailor DDC system to specific and unique requirements of equipment installed, to programs implemented and to staffing and operational practices planned.
2. Online modification of DDC system configuration, program parameters, and database using menu selection and keyboard entry of data into preformatted display templates.
3. As a minimum, include the following modification capability:

    a. Operator assignment shall include designation of operator passwords, access levels, point segregation and auto sign-off.
    b. Peripheral assignment capability shall include assignment of segregation groups and operators to consoles and printers, designation of backup workstations and printers, designation of workstation header points and enabling and disabling of print-out of operator changes.
    c. System configuration and diagnostic capability shall include communications and peripheral port assignments, DDC controller assignments to network, DDC controller enable and disable, assignment of command trace to points and application programs and initiation of diagnostics.
    d. System text addition and change capability shall include English or native language descriptors for points, segregation groups and access levels and action messages for alarms, run time and trouble condition.
    e. Time and schedule change capability shall include time and date set, time and occupancy schedules, exception and holiday schedules and daylight savings time schedules.
    f. Point related change capability shall include the following:

        1) System and point enable and disable.
        2) Run-time enable and disable.
        3) Assignment of points to segregation groups, calibration tables, lockout, and run time and to a fixed I/O value.
        4) Assignment of alarm and warning limits.

    g. Application program change capability shall include the following:

        1) Enable and disable of software programs.
        2) Programming changes.
        3) Assignment of comfort limits, global points, time and event initiators, time and event schedules and enable and disable time and event programs.

4. Software shall allow operator to add points, or groups of points, to DDC system and to link them to energy optimization and management programs. Additions and modifications shall be online programmable using operator workstation, downloaded to other network devices and entered into their databases. After verification of point additions and associated program operation, database shall be uploaded and recorded on hard drive and disk for archived record.
5. Include high-level language programming software capability for implementation of custom DDC programs. Software shall include a compiler, linker, and up- and down-load capability.

6. Include a library of DDC algorithms, intrinsic control operators, arithmetic, logic and relational operators for implementation of control sequences. Also include, as a minimum, the following:

    a. Proportional control (P).
    b. Proportional plus integral (PI).
    c. Proportional plus integral plus derivative (PID).
    d. Adaptive and intelligent self-learning control.

        1) Algorithm shall monitor loop response to output corrections and adjust loop response characteristics according to time constant changes imposed.
        2) Algorithm shall operate in a continuous self-learning manner and shall retain in memory a stored record of system dynamics so that on system shut down and restart, learning process starts from where it left off.

7. Fully implemented intrinsic control operators including sequence, reversing, ratio, time delay, time of day, highest select AO, lowest select AO, analog controlled digital output, analog control AO, and digitally controlled AO.
8. Logic operators such as "And," "Or," "Not," and others that are part of a standard set available with a high-level language.
9. Arithmetic operators such as "Add," "Subtract," "Multiply," "Divide," and others that are part of a standard set available with a high-level language.
10. Relational operators such as "Equal To," "Not Equal To," "Less Than," "Greater Than," and others that are part of a standard set available with a high-level language.

F. Alarm Handling Software:

1. Include alarm handling software to report all alarm conditions monitored and transmitted through DDC controllers.
2. Include first in, first out handling of alarms according to alarm priority ranking, with most critical alarms first, and with buffer storage in case of simultaneous and multiple alarms.
3. Alarm handling shall be active at all times to ensure that alarms are processed even if an operator is not currently signed on to DDC system.
4. Alarms display shall include the following:

    a. Indication of alarm condition such as "Abnormal Off," "Hi Alarm," and "Low Alarm."
    b. "Analog Value" or "Status" group and point identification with native language point descriptor such as "Space Temperature, Building 110, 2nd Floor, Room 212."
    c. Discrete per point alarm action message, such as "Call Maintenance Dept. Ext-5561."
    d. Include extended message capability to allow assignment and printing of extended action messages. Capability shall be operator programmable and assignable on a per point basis.

5. Alarms shall be directed to appropriate operator workstations, printers, and individual operators by privilege level and segregation assignments.
6. Send e-mail alarm messages to designated operators.
7. Send e-mail, page, text and voice messages to designated operators for critical alarms.

8. Alarms shall be categorized and processed by class.

    a. Class 1:

        1) Associated with fire, security and other extremely critical equipment monitoring functions; have alarm, trouble, return to normal, and acknowledge conditions printed and displayed.
        2) Unacknowledged alarms to be placed in unacknowledged alarm buffer.
        3) All conditions shall cause an audible sound and shall require individual acknowledgment to silence audible sound.

    b. Class 2:

        1) Critical, but not life-safety related, and processed same as Class 1 alarms, except do not require individual acknowledgment.
        2) Acknowledgement may be through a multiple alarm acknowledgment.

    c. Class 3:

        1) General alarms; printed, displayed and placed in unacknowledged alarm buffer queues.
        2) Each new alarm received shall cause an audible sound. Audible sound shall be silenced by "acknowledging" alarm or by pressing a "silence" key.
        3) Acknowledgement of queued alarms shall be either on an individual basis or through a multiple alarm acknowledgement.
        4) Alarms returning to normal condition shall be printed and not cause an audible sound or require acknowledgment.

    d. Class 4:

        1) Routine maintenance or other types of warning alarms.
        2) Alarms to be printed only, with no display, no audible sound and no acknowledgment required.

9. Include an unacknowledged alarm indicator on display to alert operator that there are unacknowledged alarms in system. Operator shall be able to acknowledge alarms on an individual basis or through a multiple alarm acknowledge key, depending on alarm class.
10. To ensure that no alarm records are lost, it shall be possible to assign a backup printer to accept alarms in case of failure of primary printer.

G. Reports and Logs:

1. Include reporting software package that allows operator to select, modify, or create reports using DDC system I/O point data available.
2. Each report shall be definable as to data content, format, interval and date.
3. Report data shall be sampled and stored on DDC controller, within storage limits of DDC controller, and then uploaded to archive on workstation for historical reporting.
4. Operator shall be able to obtain real-time logs of all I/O points by type or status, such as alarm, point lockout, or normal.

5. Reports and logs shall be stored on workstation hard drives in a format that is readily accessible by other standard software applications, including spreadsheets and word processing.
6. Reports and logs shall be readily printed and set to be printed either on operator command or at a specific time each day.

H. Standard Reports: Standard DDC system reports shall be provided and operator shall be able to customize reports later.

1. All I/O: With current status and values.
2. Alarm: All current alarms, except those in alarm lockout.
3. Disabled I/O: All I/O points that are disabled.
4. Alarm Lockout I/O: All I/O points in alarm lockout, whether manual or automatic.
5. Alarm Lockout I/O in Alarm: All I/O in alarm lockout that are currently in alarm.
6. Logs:

    a. Alarm history.
    b. System messages.
    c. System events.
    d. Trends.

I. Standard Trends:

1. Trend all I/O point present values, set points, and other parameters indicated for trending.
2. Trends shall be associated into groups, and a trend report shall be set up for each group.
3. Trends shall be stored within DDC controller and uploaded to hard drives automatically on reaching 75 of DDC controller buffer limit, or by operator request, or by archiving time schedule.
4. Preset trend intervals for each I/O point after review with Owner.
5. Trend intervals shall be operator selectable from 10 seconds up to 60 minutes. Minimum number of consecutive trend values stored at one time shall be 100 per variable.
6. When drive storage memory is full, most recent data shall overwrite oldest data.
7. Archived and real-time trend data shall be available for viewing numerically and graphically by operators.

J. Custom Trends: Operator shall be able to define a custom trend log for any I/O point in DDC system.

1. Each trend shall include interval, start time, and stop time.
2. Data shall be sampled and stored on DDC controller, within storage limits of DDC controller, and then uploaded to archive on workstation hard drives.
3. Data shall be retrievable for use in spreadsheets and standard database programs.

K. Programming Software:

1. Include programming software to execute sequences of operation indicated.
2. Include programming routines in simple and easy to follow logic with detailed text comments describing what the logic does and how it corresponds to sequence of operation.
3. Programming software shall be any of the following:

a. Graphic Based: Programming shall use a library of function blocks made from preprogrammed code designed for DDC control systems.

1) Function blocks shall be assembled with interconnection lines that represent to control sequence in a flowchart.
2) Programming tools shall be viewable in real time to show present values and logical results of each function block.

b. Menu Based: Programming shall be done by entering parameters, definitions, conditions, requirements and constraints.
c. Line by Line and Text Based: Programming shall declare variable types such as local, global, real, integer, and so on, at the beginning of the program. Use descriptive comments frequently to describe programming code.

4. Include means for detecting programming errors and testing software control strategies with a simulation tool before implementing in actual control. Simulation tool may be inherent with programming software or as a separate product.

L. Database Management Software:

1. Where a separate SQL database is used for information storage, DDC system shall include database management software that separates database monitoring and managing functions by supporting multiple separate windows.
2. Database secure access shall be accomplished using standard SQL authentication including ability to access data for use outside of DDC system applications.
3. Database management function shall include summarized information on trend, alarm, event, and audit for the following database management actions:

a. Backup.
b. Purge.
c. Restore.

4. Database management software shall support the following:

a. Statistics: Display database server information and trend, alarm, event, and audit information on database.
b. Maintenance: Include method of purging records from trend, alarm, event and audit databases by supporting separate screens for creating a backup before purging, selecting database, and allowing for retention of a selected number of day's data.
c. Backup: Include means to create a database backup file and select a storage location.
d. Restore: Include a restricted means of restoring a database by requiring operator to have proper security level.

5. Database management software shall include information of current database activity, including the following:

a. Ready.
b. Purging record from a database.
c. Action failed.

d. Refreshing statistics.
e. Restoring database.
f. Shrinking a database.
g. Backing up a database.
h. Resetting Internet information services.
i. Starting network device manager.
j. Shutting down the network device manager.
k. Action successful.

6. Database management software monitoring functions shall continuously read database information once operator has logged on.
7. Include operator notification through on-screen pop-up display and e-mail message when database value has exceeded a warning or alarm limit.
8. Monitoring settings window shall have the following sections:

a. Allow operator to set and review scan intervals and start times.
b. E-mail: Allow operator to create and review e-mail and phone text messages to be delivered when a warning or an alarm is generated.
c. Warning: Allow operator to define warning limit parameters, set reminder frequency and link e-mail message.
d. Alarm: Allow operator to define alarm limit parameters, set reminder frequency and link e-mail message.
e. Database Login: Protect system from unauthorized database manipulation by creating a read access and a write access for each of trend, alarm, event and audit databases as well as operator proper security access to restore a database.

9. Monitoring settings taskbar shall include the following informational icons:

a. Normal: Indicates by color and size, or other easily identifiable means that all databases are within their limits.
b. Warning: Indicates by color and size, or other easily identifiable means that one or more databases have exceeded their warning limit.
c. Alarm: Indicates by color and size, or other easily identifiable means that one or more databases have exceeded their alarm limit.

2.9 DDC CONTROLLERS

A. DDC system shall consist of a combination of network controllers, programmable application controllers and application-specific controllers to satisfy performance requirements indicated.

B. DDC controllers shall perform monitoring, control, energy optimization and other requirements indicated.

C. DDC controllers shall use a multitasking, multiuser, real-time digital control microprocessor with a distributed network database and intelligence.

D. Each DDC controller shall be capable of full and complete operation as a completely independent unit and as a part of a DDC system wide distributed network.

E. Environment Requirements:

1. Controller hardware shall be suitable for the anticipated ambient conditions.
2. Controllers located in conditioned space shall be rated for operation at 32 to 120 degrees F.
3. Controllers located outdoors shall be rated for operation at 20 to 150 degrees F.

F. Power and Noise Immunity:

1. Controller shall operate at 90 to 110 percent of nominal voltage rating and shall perform an orderly shutdown below 80 percent of nominal voltage.
2. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios with up to 5 W of power located within 36 inches of enclosure.

G. DDC Controller Spare Processing Capacity:

1. Include spare processing memory for each controller. RAM, PROM, or EEPROM will implement requirements indicated with the following spare memory:

    a. Programmable Application Controllers: Not less than 60 percent.
    b. Application-Specific Controllers: Not less than 70 percent.

2. Memory shall support DDC controller's operating system and database and shall include the following:

    a. Monitoring and control.
    b. Energy management, operation and optimization applications.
    c. Alarm management.
    d. Historical trend data of all connected I/O points.
    e. Maintenance applications.
    f. Operator interfaces.
    g. Monitoring of manual overrides.

H. DDC Controller Spare I/O Point Capacity: Include spare I/O point capacity for each controller as follows:

1. Programmable Application Controllers:

    a. 20 percent of each AI, AO, BI, and BO point connected to controller.
    b. Minimum Spare I/O Points per Controller:

        1) AIs: Three.
        2) AOs: Three.
        3) BIs: Five.
        4) BOs: Five.

2. Application-Specific Controllers:

    a. 10 percent of each AI, AO, BI, and BO point connected to controller.

b. Minimum Spare I/O Points per Controller:

1) AIs: Two.
2) AOs: Two.
3) BIs: Two.
4) BOs: Two.

I. Input and Output Point Interface:

1. Hardwired input and output points shall connect to network, programmable application and application-specific controllers.
2. Input and output points shall be protected so shorting of point to itself, to another point, or to ground will not damage controller.
3. Input and output points shall be protected from voltage up to 24 V of any duration so that contact will not damage controller.
4. AIs:

a. AIs shall include monitoring of low-voltage (zero- to 10-V dc), current (4 to 20 mA) and resistance signals from thermistor and RTD sensors.
b. AIs shall be compatible with, and field configurable to, sensor and transmitters installed.
c. Controller AIs shall perform analog-to-digital (A-to-D) conversion with a minimum resolution of 12 bits or better to comply with accuracy requirements indicated.
d. Signal conditioning including transient rejection shall be provided for each AI.
e. Capable of being individually calibrated for zero and span.
f. Incorporate common-mode noise rejection of at least 50 dB from zero to 100 Hz for differential inputs, and normal-mode noise rejection of at least 20 dB at 60 Hz from a source impedance of 10000 ohms.

5. AOs:

a. Controller AOs shall perform analog-to-digital (A-to-D) conversion with a minimum resolution of 12 bits or better to comply with accuracy requirements indicated.
b. Output signals shall have a range of 4 to 20 mA dc or zero- to 10-V dc as required to include proper control of output device.
c. Capable of being individually calibrated for zero and span.
d. AOs shall not exhibit a drift of greater than 0.4 percent of range per year.

6. BIs:

a. Controller BIs shall accept contact closures and shall ignore transients of less than 5-ms duration.
b. Isolation and protection against an applied steady-state voltage of up to 180-V ac peak.
c. BIs shall include a wetting current of at least 12 mA to be compatible with commonly available control devices and shall be protected against effects of contact bounce and noise.
d. BIs shall sense "dry contact" closure without external power (other than that provided by the controller) being applied.

e. Pulse accumulation input points shall comply with all requirements of BIs and accept up to 10 pulses per second for pulse accumulation. Buffer shall be provided to totalize pulses. Pulse accumulator shall accept rates of at least 20 pulses per second. The totalized value shall be reset to zero on operator's command.

7. BOs:

a. Controller BOs shall include relay contact closures or triac outputs for momentary and maintained operation of output devices.

1) Relay contact closures shall have a minimum duration of 0.1 second. Relays shall include at least 180 V of isolation. Electromagnetic interference suppression shall be provided on all output lines to limit transients to non-damaging levels. Minimum contact rating shall be 1 A at 24-V ac.
2) Triac outputs shall include at least 180 V of isolation. Minimum contact rating shall be 1 A at 24-V ac.

b. BOs shall include for two-state operation or a pulsed low-voltage signal for pulse-width modulation control.
c. BOs shall be selectable for either normally open or normally closed operation.
d. Include tristate outputs (two coordinated BOs) for control of three-point floating-type electronic actuators without feedback.
e. Limit use of three-point floating devices to VAV terminal unit control applications,. Control algorithms shall operate actuator to one end of its stroke once every 12 hours for verification of operator tracking.

2.10 PROGRAMMABLE APPLICATION CONTROLLERS

A. General Programmable Application Controller Requirements:

1. Include adequate number of controllers to achieve performance indicated.
2. Controller shall have enough memory to support its operating system, database, and programming requirements.
3. Data shall be shared between networked controllers and other network devices.
4. Operating system of controller shall manage input and output communication signals to allow distributed controllers to share real and virtual object information and allow for central monitoring and alarms.
5. Controllers that perform scheduling shall have a real-time clock.
6. Controller shall continually check status of its processor and memory circuits. If an abnormal operation is detected, controller shall assume a predetermined failure mode and generate an alarm notification.
7. Controllers shall be fully programmable.

B. Communication:

1. Programmable application controllers shall communicate with other devices on network.

C. Operator Interface:

1. Controller shall be equipped with a service communications port for connection to a portable operator's workstation or mobile device.
2. Local Keypad and Display:

    a. Equip controller with local keypad and digital display for interrogating and editing data.
    b. Use of keypad and display shall require security password.

D. Serviceability:

1. Controller shall be equipped with diagnostic LEDs or other form of local visual indication of power, communication, and processor.
2. Wiring and cable connections shall be made to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.
3. Controller shall maintain BIOS and programming information in event of a power loss for at least 72 hours.

2.11 APPLICATION-SPECIFIC CONTROLLERS

A. Description: Microprocessor-based controllers, which through hardware or firmware design are dedicated to control a specific piece of equipment. Controllers are not fully user-programmable but are configurable and customizable for operation of equipment they are designed to control.

1. Capable of standalone operation and shall continue to include control functions without being connected to network.
2. Data shall be shared between networked controllers and other network devices.

B. Communication: Application-specific controllers shall communicate with other application-specific controller and devices on network, and to programmable application and network controllers.

C. Operator Interface: Controller shall be equipped with a service communications port for connection to a portable operator's workstation. Connection shall extend to port on space temperature sensor that is connected to controller.

D. Serviceability:

1. Controller shall be equipped with diagnostic LEDs or other form of local visual indication of power, communication, and processor.
2. Wiring and cable connections shall be made to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.
3. Controller shall use nonvolatile memory and maintain all BIOS and programming information in event of power loss.

2.12 CONTROLLER SOFTWARE

A. General Controller Software Requirements:

1. Software applications shall reside and operate in controllers. Editing of applications shall occur at operator workstations.
2. I/O points shall be identified by up to 30-character point name and up to 16-character point descriptor. Same names shall be used at operator workstations.
3. Control functions shall be executed within controllers using DDC algorithms.
4. Controllers shall be configured to use stored default values to ensure fail-safe operation. Default values shall be used when there is a failure of a connected input instrument or loss of communication of a global point value.

B. Security:

1. Operator access shall be secured using individual security passwords and usernames.
2. Passwords shall restrict operator to points, applications, and system functions as assigned by system manager.
3. Operator log-on and log-off attempts shall be recorded.
4. System shall protect itself from unauthorized use by automatically logging off after last keystroke. The delay time shall be operator-definable.

C. Scheduling: Include capability to schedule each point or group of points in system. Each schedule shall consist of the following:

1. Weekly Schedule:

   a. Include separate schedules for each day of week.
   b. Each schedule should include the capability for start, stop, optimal start, optimal stop, and night economizer.
   c. Each schedule may consist of up to 10 events.
   d. When a group of objects are scheduled together, include capability to adjust start and stop times for each member.

2. Exception Schedules:

   a. Include ability for operator to designate any day of the year as an exception schedule.
   b. Exception schedules may be defined up to a year in advance. Once an exception schedule is executed, it will be discarded and replaced by regular schedule for that day of week.

3. Holiday Schedules:

   a. Include capability for operator to define up to 99 special or holiday schedules.
   b. Schedules may be placed on scheduling calendar and will be repeated each year.
   c. Operator shall be able to define length of each holiday period.

D. System Coordination:

1. Include standard application for proper coordination of equipment.
2. Application shall include operator with a method of grouping together equipment based on function and location.
3. Group may then be used for scheduling and other applications.

E. Binary Alarms:

1. Each binary point shall be set to alarm based on operator-specified state.
2. Include capability to automatically and manually disable alarming.

F. Analog Alarms:

1. Each analog object shall have both high and low alarm limits.
2. Alarming shall be able to be automatically and manually disabled.

G. Alarm Reporting:

1. Operator shall be able to determine action to be taken in event of an alarm.
2. Alarms shall be routed to appropriate operator workstations based on time and other conditions.
3. Alarm shall be able to start programs, print, be logged in event log, generate custom messages, and display graphics.

H. Remote Communication:

1. System shall have ability to dial out in the event of an alarm.

I. Maintenance Management: System shall monitor equipment status and generate maintenance messages based on operator-designated run-time, starts, and calendar date limits.

J. Sequencing: Include application software based on sequences of operation indicated to properly sequence chillers, boilers, and other applicable HVAC equipment.

K. Control Loops:

1. Support any of the following control loops, as applicable to control required:

a. Two-position (on/off, open/close, slow/fast) control.
b. Proportional control.
c. Proportional plus integral (PI) control.
d. Proportional plus integral plus derivative (PID) control.

1) Include PID algorithms with direct or reverse action and anti-windup.
2) Algorithm shall calculate a time-varying analog value used to position an output or stage a series of outputs.
3) Controlled variable, set point, and PID gains shall be operator-selectable.

e. Adaptive (automatic tuning).

L. Staggered Start: Application shall prevent all controlled equipment from simultaneously restarting after a power outage. Order which equipment (or groups of equipment) is started, along with the time delay between starts, shall be operator-selectable.

M. Anti-Short Cycling:

1. BO points shall be protected from short cycling.
2. Feature shall allow minimum on-time and off-time to be selected.

N. On and Off Control with Differential:

1. Include an algorithm that allows a BO to be cycled based on a controlled variable and set point.
2. Algorithm shall be direct- or reverse-acting and incorporate an adjustable differential.

O. Run-Time Totalization:

1. Include software to totalize run-times for all BI and BO points.
2. A high run-time alarm shall be assigned, if required, by operator.

2.13 ELECTRICAL POWER DEVICES

A. Transformers:

1. Transformer shall be sized for the total connected load, plus an additional 25 percent of connected load.
2. Transformer shall have both primary and secondary fuses.

B. DC Power Supply:

1. Plug-in style suitable for mating with a standard eight-pin octal socket. Include the power supply with a mating mounting socket.
2. Enclose circuitry in a housing.
3. Include both line and load regulation to ensure a stable output. To protect both the power supply and the load, power supply shall have an automatic current limiting circuit.
4. Performance:

    a. Output voltage nominally 25-V dc within 5 percent.
    b. Output current up to 100 mA.
    c. Input voltage nominally 120-V ac, 60 Hz.
    d. Load regulation within 0.5 percent from zero- to 100-mA load.
    e. Line regulation within 0.5 percent at a 100-mA load for a 10 percent line change.
    f. Stability within 0.1 percent of rated volts for 24 hours after a 20-minute warmup.

2.14 CONTROL WIRE AND CABLE

A. Wire: Single conductor control wiring above 24 V.

1. Wire size shall be at least No. 18 AWG.
2. Conductor shall be 7/24 soft annealed copper strand with 2- to 2.5-inch lay.
3. Conductor insulation shall be 600 V, Type THWN or Type THHN, and 90 degrees C according to UL 83.
4. Conductor colors shall be black (hot), white (neutral), and green (ground).
5. Furnish wire on spools.

B. Single Twisted Shielded Instrumentation Cable above 24 V:

1. Wire size shall be a minimum No. 18 AWG.
2. Conductors shall be a twisted, 7/24 soft annealed copper strand with a 2- to 2.5-inch lay.

3. Conductor insulation shall have a Type THHN/THWN or Type TFN rating.
4. Shielding shall be 100 percent type, 0.35/0.5-mil aluminum/Mylar tape, helically applied with 25 percent overlap, and aluminum side in with tinned copper drain wire.
5. Outer jacket insulation shall have a 600-V, 90-degrees C rating and shall be Type TC cable.
6. For twisted pair, conductor colors shall be black and white. For twisted triad, conductor colors shall be black, red and white.
7. Furnish wire on spools.

C. Single Twisted Shielded Instrumentation Cable 24 V and Less:

1. Wire size shall be a minimum No. 18 AWG.
2. Conductors shall be a twisted, 7/24 soft annealed copper stranding with a 2- to 2.5-inch lay.
3. Conductor insulation shall have a nominal 15-mil thickness, constructed from flame-retardant PVC.
4. Shielding shall be 100 percent type, 1.35-mil aluminum/polymer tape, helically applied with 25 percent overlap, and aluminum side in with tinned copper drain wire.
5. Outer jacket insulation shall have a 300-V, 105-degrees C rating and shall be Type PLTC cable.
6. For twisted pair, conductor colors shall be black and white. For twisted triad, conductor colors shall be black, red and white.
7. Furnish wire on spools.

2.15 ACCESSORIES

A. Damper Blade Limit Switches:

1. Sense positive open and/or closed position of the damper blades.
2. NEMA 250, Type 13, oil-tight construction.
3. Arrange for the mounting application.
4. Additional waterproof enclosure when required by its environment.
5. Arrange to prevent "over-center" operation.

2.16 IDENTIFICATION

A. Control Equipment, Instruments, and Control Devices:

1. Laminated acrylic or melamine plastic sign bearing unique identification.

    a. Include instruments with unique identification identified by equipment being controlled or monitored, followed by point identification.

2. Legend shall consist of white lettering on black background.
3. Laminated acrylic or melamine plastic sign shall be engraved phenolic consisting of three layers of rigid laminate. Top and bottom layers are color-coded black with contrasting white center exposed by engraving through outer layer and shall be fastened with drive pins.

4. Instruments, control devices and actuators with Project-specific identification tags having unique identification numbers following requirements indicated and provided by original manufacturer do not require additional identification.

B. Raceway and Boxes:

1. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
2. Paint cover plates on junction boxes and conduit same color as the tape banding for conduits. After painting, label cover plate "HVAC Controls," using an engraved phenolic tag.
3. For raceways housing pneumatic tubing, add a phenolic tag labeled "HVAC Instrument Air Tubing."
4. For raceways housing air signal tubing, add a phenolic tag labeled "HVAC Air Signal Tubing."

C. Equipment Warning Labels:

1. Self-adhesive label with pressure-sensitive adhesive back and peel-off protective jacket.
2. Lettering size shall be at least 14-point type with white lettering on red background.
3. Warning label shall read "CAUTION-Equipment operated under remote automatic control and may start or stop at any time without warning. Switch electric power disconnecting means to OFF position before servicing."
4. Lettering shall be enclosed in a white line border. Edge of label shall extend at least 0.25 inch beyond white border.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify compatibility with and suitability of substrates.

B. Examine roughing-in for products to verify actual locations of connections before installation.

1. Examine roughing-in for instruments installed in duct systems to verify actual locations of connections before installation.

C. Examine walls, floors, roofs, and ceilings for suitable conditions where product will be installed.

D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install products to satisfy more stringent of all requirements indicated.

B. Install products level, plumb, parallel, and perpendicular with building construction.

C. If codes and referenced standards are more stringent than requirements indicated, comply with requirements in codes and referenced standards.

D. Fabricate openings and install sleeves in ceilings, floors, roof, and walls required by installation of products. Before proceeding with drilling, punching, and cutting, check for concealed work to avoid damage. Patch, flash, grout, seal, and refinish openings to match adjacent condition.

E. Seal penetrations made in acoustically rated assemblies. Comply with requirements in Section 079200 "Joint Sealants."

F. Fastening Hardware:

1. Stillson wrenches, pliers, and other tools that damage surfaces of rods, nuts, and other parts are prohibited for work of assembling and tightening fasteners.
2. Tighten bolts and nuts firmly and uniformly. Do not overstress threads by excessive force or by oversized wrenches.
3. Lubricate threads of bolts, nuts and screws with graphite and oil before assembly.

G. If product locations are not indicated, install products in locations that are accessible and that will permit service and maintenance from floor, equipment platforms, or catwalks without removal of permanently installed furniture and equipment.

H. Corrosive Environments:

1. Avoid or limit use of materials in corrosive airstreams and environments, including, but not limited to, the following:

    a. Laboratory exhaust-air streams.
    b. Process exhaust-air streams.

2. When conduit is in contact with a corrosive airstream and environment, use Type 316 stainless-steel conduit and fittings or conduit and fittings that are coated with a corrosive-resistant coating that is suitable for environment. Comply with requirements for installation of raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."
3. Where instruments are located in a corrosive airstream and are not corrosive resistant from manufacturer, field install products in NEMA 250, Type 4X enclosure constructed of Type 316L stainless steel.

3.3 CONTROLLER INSTALLATION

A. Install controllers in enclosures to comply with indicated requirements.

B. Connect controllers to field power supply.

C. Install controller with latest version of applicable software and configure to execute requirements indicated.

D. Test and adjust controllers to verify operation of connected I/O to achieve performance indicated requirements while executing sequences of operation.

E. Installation of Programmable Application Controllers:

1. Quantity and location of programmable application controllers shall be determined by DDC system manufacturer to satisfy requirements indicated.
2. Install controllers in a protected location that is easily accessible by operators.

F. Application-Specific Controllers:

1. Quantity and location of application-specific controllers shall be determined by DDC system manufacturer to satisfy requirements indicated.
2. For controllers not mounted directly on equipment being controlled, install controllers in a protected location that is easily accessible by operators.

3.4 ELECTRIC POWER CONNECTIONS

A. Connect electrical power to DDC system products requiring electrical power connections.

B. Design of electrical power to products not indicated with electric power is delegated to DDC system provider and installing trade. Work shall comply with NFPA 70 and other requirements indicated.

C. Comply with requirements in Section 262816 "Enclosed Switches and Circuit Breakers" for electrical power circuit breakers.

D. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for electrical power conductors and cables.

E. Comply with requirements in Section 260533 "Raceways and Boxes for Electrical Systems" for electrical power raceways and boxes.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements in Section 260553 "Identification for Electrical Systems" for identification products and installation.

B. Install laminated acrylic or melamine plastic signs with unique identification on face for each of the following:

1. DDC controller.
2. Electrical power device.
3. Accessory.

C. Install unique instrument identification on face of each instrument connected to a DDC controller.

D. Install unique identification on face of each control damper actuator connected to a DDC controller.

E. Where product is installed above accessible tile ceiling, also install matching identification on face of ceiling grid located directly below.

F. Where product is installed above an inaccessible ceiling, also install identification on face of access door directly below.

G. Warning Labels and Signs:

1. Shall be permanently attached to equipment that can be automatically started by DDC control system.
2. Shall be located in highly visible location near power service entry points.

3.6 CONTROL WIRE, CABLE AND RACEWAYS INSTALLATION

A. Comply with NECA 1.

B. Wire and Cable Installation:

1. Comply with installation requirements in Section 260523 "Control-Voltage Electrical Power Cables."
2. Comply with installation requirements in Section 271313 "Communications Copper Backbone Cabling."
3. Comply with installation requirements in Section 271513 "Communications Copper Horizontal Cabling."
4. Install cables with protective sheathing that is waterproof and capable of withstanding continuous temperatures of 90 degrees C with no measurable effect on physical and electrical properties of cable.

    a. Provide shielding to prevent interference and distortion from adjacent cables and equipment.

5. Terminate wiring in a junction box.

    a. Clamp cable over jacket in junction box.
    b. Individual conductors in the stripped section of the cable shall be slack between the clamping point and terminal block.

6. Terminate field wiring and cable not directly connected to instruments and control devices having integral wiring terminals using terminal blocks.
7. Install signal transmission components according to IEEE C2, REA Form 511a, NFPA 70, and as indicated.
8. Use shielded cable to transmitters.
9. Use shielded cable to temperature sensors.
10. Perform continuity and meager testing on wire and cable after installation.

C. Conduit Installation:

1. Comply with Section "260533 "Raceways and Boxes for Electrical Systems" for control-voltage conductors.
2. Comply with Section 270528 "Pathways for Communications Systems" for balanced twisted pair cabling and optical fiber installation.

3.7 OPTICAL FIBER CABLE SYSTEM INSTALLATION

A. Comply with installation requirements in Section 271323 "Communications Optical Fiber Backbone Cabling."

B. Comply with installation requirements in Section 271523 "Communications Optical Fiber Horizontal Cabling."

3.8 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and installations, including connections.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Testing:

1. Perform preinstallation, in-progress, and final tests, supplemented by additional tests, as necessary.
2. Preinstallation Cable Verification: Verify integrity and serviceability for new cable lengths before installation. This assurance may be provided by using vendor verification documents, testing, or other methods. As a minimum, furnish evidence of verification for cable attenuation and bandwidth parameters.
3. In-Progress Testing: Perform standard tests for correct pair identification and termination during installation to ensure proper installation and cable placement. Perform tests in addition to those specified if there is any reason to question condition of material furnished and installed. Testing accomplished is to be documented by agency conducting tests. Submit test results for Project record.
4. Final Testing: Perform final test of installed system to demonstrate acceptability as installed. Testing shall be performed according to a test plan supplied by DDC system manufacturer. Defective Work or material shall be corrected and retested. As a minimum, final testing for cable system, including spare cable, shall verify conformance of attenuation, length, and bandwidth parameters with performance indicated.
5. Test Equipment: Use an optical fiber time domain reflectometer for testing of length and optical connectivity.
6. Test Results: Record test results and submit copy of test results for Project record.

3.9 DDC SYSTEM I/O CHECKOUT PROCEDURES

A. Check installed products before continuity tests, leak tests and calibration.

B. Check instruments for proper location and accessibility.

C. Check instruments for proper installation on direction of flow, elevation, orientation, insertion depth, or other applicable considerations that will impact performance.

D. Check instrument tubing for proper isolation, fittings, slope, dirt legs, drains, material and support.

E. For pneumatic products, verify that air supply for each product is properly installed.

F. Control Damper Checkout:

1. For pneumatic dampers, verify that pressure gages are provided in each air line to damper actuator and positioner.
2. Verify that control dampers are installed correctly for flow direction.
3. Verify that proper blade alignment, either parallel or opposed, has been provided.
4. Verify that damper frame attachment is properly secured and sealed.
5. Verify that damper actuator and linkage attachment is secure.
6. Verify that actuator wiring is complete, enclosed and connected to correct power source.
7. Verify that damper blade travel is unobstructed.

G. Instrument Checkout:

1. Verify that instrument is correctly installed for location, orientation, direction and operating clearances.
2. Verify that attachment is properly secured and sealed.
3. Verify that conduit connections are properly secured and sealed.
4. Verify that wiring is properly labeled with unique identification, correct type and size and is securely attached to proper terminals.
5. Inspect instrument tag against approved submittal.
6. For instruments with tubing connections, verify that tubing attachment is secure and isolation valves have been provided.
7. For flow instruments, verify that recommended upstream and downstream distances have been maintained.
8. For temperature instruments:

    a. Verify sensing element type and proper material.
    b. Verify length and insertion.

3.10 DDC SYSTEM I/O ADJUSTMENT, CALIBRATION AND TESTING:

A. Calibrate each instrument installed that is not factory calibrated and provided with calibration documentation.

B. Provide a written description of proposed field procedures and equipment for calibrating each type of instrument. Submit procedures before calibration and adjustment.

C. For each analog instrument, make a three-point test of calibration for both linearity and accuracy.

D. Equipment and procedures used for calibration shall comply with instrument manufacturer's written instructions.

E. Provide diagnostic and test equipment for calibration and adjustment.

F. Field instruments and equipment used to test and calibrate installed instruments shall have accuracy at least twice the instrument accuracy being calibrated. An installed instrument with an accuracy of 1 percent shall be checked by an instrument with an accuracy of 0.5 percent.

G. Calibrate each instrument according to instrument instruction manual supplied by manufacturer.

H. If after calibration indicated performance cannot be achieved, replace out-of-tolerance instruments.

I. Comply with field testing requirements and procedures indicated by ASHRAE's Guideline 11, "Field Testing of HVAC Control Components," in the absence of specific requirements, and to supplement requirements indicated.

J. Analog Signals:

1. Check analog voltage signals using a precision voltage meter at zero, 50, and 100 percent.
2. Check analog current signals using a precision current meter at zero, 50, and 100 percent.
3. Check resistance signals for temperature sensors at zero, 50, and 100 percent of operating span using a precision-resistant source.

K. Digital Signals:

1. Check digital signals using a jumper wire.
2. Check digital signals using an ohmmeter to test for contact making or breaking.

L. Control Dampers:

1. Stroke and adjust control dampers following manufacturer's recommended procedure, from 100 percent open to 100 percent closed and back to 100 percent open.
2. Stroke control dampers with pilot positioners. Adjust damper and positioner following manufacturer's recommended procedure, so damper is 100 percent closed, 50 percent closed and 100 percent open at proper air pressure.
3. Check and document open and close cycle times for applications with a cycle time less than 30 seconds.
4. For control dampers equipped with positive position indication, check feedback signal at multiple positions to confirm proper position indication.

M. Meters: Check sensors at zero, 50, and 100 percent of Project design values.

N. Sensors: Check sensors at zero, 50, and 100 percent of Project design values.

O. Switches: Calibrate switches to make or break contact at set points indicated.

P. Transmitters:

1. Check and calibrate transmitters at zero, 50, and 100 percent of Project design values.
2. Calibrate resistance temperature transmitters at zero, 50, and 100 percent of span using a precision-resistant source.

3.11 DDC SYSTEM CONTROLLER CHECKOUT

A. Verify power supply.

1. Verify voltage, phase and hertz.
2. Verify that protection from power surges is installed and functioning.
3. Verify that ground fault protection is installed.
4. If applicable, verify if connected to UPS unit.
5. If applicable, verify if connected to a backup power source.
6. If applicable, verify that power conditioning units, transient voltage suppression and high-frequency noise filter units are installed.

B. Verify that wire and cabling is properly secured to terminals and labeled with unique identification.

C. Verify that spare I/O capacity is provided.

3.12 DDC CONTROLLER I/O CONTROL LOOP TESTS

A. Testing:

1. Test every I/O point connected to DDC controller to verify that safety and operating control set points are as indicated and as required to operate controlled system safely and at optimum performance.
2. Test every I/O point throughout its full operating range.
3. Test every control loop to verify operation is stable and accurate.
4. Adjust control loop proportional, integral and derivative settings to achieve optimum performance while complying with performance requirements indicated. Document testing of each control loop's precision and stability via trend logs.
5. Test and adjust every control loop for proper operation according to sequence of operation.
6. Test software and hardware interlocks for proper operation. Correct deficiencies.
7. Operate each analog point at the following:

    a. Upper quarter of range.
    b. Lower quarter of range.
    c. At midpoint of range.

8. Exercise each binary point.
9. For every I/O point in DDC system, read and record each value at operator workstation, at DDC controller and at field instrument simultaneously. Value displayed at operator workstation, at DDC controller and at field instrument shall match.

10. Prepare and submit a report documenting results for each I/O point in DDC system and include in each I/O point a description of corrective measures and adjustments made to achieve desire results.

3.13 DDC SYSTEM VALIDATION TESTS

A. Perform validation tests before requesting final review of system. Before beginning testing, first submit Pretest Checklist and Test Plan.

B. After approval of Test Plan, execute all tests and procedures indicated in plan.

C. After testing is complete, submit completed test checklist.

D. Pretest Checklist: Submit the following list with items checked off once verified:

1. Detailed explanation for any items that are not completed or verified.
2. Required mechanical installation work is successfully completed and HVAC equipment is working correctly.
3. HVAC equipment motors operate below full-load amperage ratings.
4. Required DDC system components, wiring, and accessories are installed.
5. Installed DDC system architecture matches approved Drawings.
6. Control electric power circuits operate at proper voltage and are free from faults.
7. Required surge protection is installed.
8. DDC system network communications function properly, including uploading and downloading programming changes.
9. Using BACnet protocol analyzer, verify that communications are error free.
10. Each controller's programming is backed up.
11. Equipment, products, tubing, wiring cable and conduits are properly labeled.
12. All I/O points are programmed into controllers.
13. Testing, adjusting and balancing work affecting controls is complete.
14. Dampers and actuators zero and span adjustments are set properly.
15. Each control damper and actuator goes to failed position on loss of power.
16. Meter, sensor and transmitter readings are accurate and calibrated.
17. Control loops are tuned for smooth and stable operation.
18. View trend data where applicable.
19. Each controller works properly in standalone mode.
20. Safety controls and devices function properly.
21. Interfaces with fire-alarm system function properly.
22. Electrical interlocks function properly.
23. Record Drawings are completed.

E. Test Plan:

1. Prepare and submit a validation test plan including test procedures for performance validation tests.
2. Test plan shall address all specified functions of DDC system and sequences of operation.
3. Explain detailed actions and expected results to demonstrate compliance with requirements indicated.
4. Explain method for simulating necessary conditions of operation used to demonstrate performance.

5. Include a test checklist to be used to check and initial that each test has been successfully completed.
6. Submit test plan documentation 10 business days before start of tests.

F. Validation Test:

1. Verify operating performance of each I/O point in DDC system.

    a. Verify analog I/O points at operating value.
    b. Make adjustments to out-of-tolerance I/O points.

        1) Identify I/O points for future reference.
        2) Simulate abnormal conditions to demonstrate proper function of safety devices.
        3) Replace instruments and controllers that cannot maintain performance indicated after adjustments.

2. Readjust settings to design values and observe ability of DDC system to establish desired conditions.
3. After 24 Hours following Initial Validation Test:

    a. Re-check I/O points that required corrections during initial test.
    b. Identify I/O points that still require additional correction and make corrections necessary to achieve desired results.

4. After 24 Hours of Second Validation Test:

    a. Re-check I/O points that required corrections during second test.
    b. Continue validation testing until I/O point is normal on two consecutive tests.

5. Completely check out, calibrate, and test all connected hardware and software to ensure that DDC system performs according to requirements indicated.
6. After validation testing is complete, prepare and submit a report indicating all I/O points that required correction and how many validation re-tests it took to pass. Identify adjustments made for each test and indicate instruments that were replaced.

3.14 FINAL REVIEW

A. Submit written request to Engineer and Construction Manager when DDC system is ready for final review. Written request shall state the following:

1. DDC system has been thoroughly inspected for compliance with contract documents and found to be in full compliance.
2. DDC system has been calibrated, adjusted and tested and found to comply with requirements of operational stability, accuracy, speed and other performance requirements indicated.
3. DDC system monitoring and control of HVAC systems results in operation according to sequences of operation indicated.
4. DDC system is complete and ready for final review.

B. Review by Engineer and Construction Manager shall be made after receipt of written request. A field report shall be issued to document observations and deficiencies.

C. Take prompt action to remedy deficiencies indicated in field report and submit a second written request when all deficiencies have been corrected. Repeat process until no deficiencies are reported.

D. Should more than two reviews be required, DDC system manufacturer and Installer shall compensate entity performing review for total costs, labor and expenses, associated with third and subsequent reviews. Estimated cost of each review shall be submitted and approved by DDC system manufacturer and Installer before making the review.

E. Prepare and submit closeout submittals when no deficiencies are reported.

F. A part of DDC system final review shall include a demonstration to parties participating in final review.

1. Provide staff familiar with DDC system installed to demonstrate operation of DDC system during final review.
2. Provide testing equipment to demonstrate accuracy and other performance requirements of DDC system that is requested by reviewers during final review.
3. Demonstration shall include, but not be limited to, the following:

    a. Accuracy and calibration of 10 I/O points randomly selected by reviewers. If review finds that some I/O points are not properly calibrated and not satisfying performance requirements indicated, additional I/O points may be selected by reviewers until total I/O points being reviewed that satisfy requirements equals quantity indicated.
    b. HVAC equipment and system hardwired and software safeties and life-safety functions are operating according to sequence of operation. Up to 10 I/O points shall be randomly selected by reviewers. Additional I/O points may be selected by reviewers to discover problems with operation.
    c. Correct sequence of operation after electrical power interruption and resumption after electrical power is restored for randomly selected HVAC systems.
    d. Operation of randomly selected dampers and valves in normal-on, normal-off and failed positions.
    e. Reporting of alarm conditions for randomly selected alarms, including different classes of alarms, to ensure that alarms are properly received by operators and operator workstations.
    f. Trends, summaries, logs and reports set-up for Project.
    g. For up to three HVAC systems randomly selected by reviewers, use graph trends to show that sequence of operation is executed in correct manner and that HVAC systems operate properly through complete sequence of operation including different modes of operations indicated. Show that control loops are stable and operating at set points and respond to changes in set point of 20 percent or more.
    h. Software's ability to communicate with controllers, operator workstations, uploading and downloading of control programs.
    i. Software's ability to edit control programs off-line.
    j. Data entry to show Project-specific customizing capability including parameter changes.

k. Step through penetration tree, display all graphics, demonstrate dynamic update, and direct access to graphics.
l. Execution of digital and analog commands in graphic mode.
m. Spreadsheet and curve plot software and its integration with database.
n. Online user guide and help functions.
o. Multitasking by showing different operations occurring simultaneously on four quadrants of split screen.
p. System speed of response compared to requirements indicated.
q. For Each Programmable Application Controller:

1) Memory: Programmed data, parameters, trend and alarm history collected during normal operation is not lost during power failure.
2) Operator Interface: Ability to connect directly to each type of digital controller with a portable workstation and mobile device. Show that maintenance personnel interface tools perform as indicated in manufacturer's technical literature.
3) Standalone Ability: Demonstrate that controllers provide stable and reliable standalone operation using default values or other method for values normally read over network.
4) Electric Power: Ability to disconnect any controller safely from its power source.
5) Wiring Labels: Match control drawings.
6) Network Communication: Ability to locate a controller's location on network and communication architecture matches Shop Drawings.
7) Nameplates and Tags: Accurate and permanently attached to control panel doors, instrument, actuators and devices.

3.15 SOFTWARE SERVICE AGREEMENT

A. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.

B. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.

1. Upgrade Notice: At least 30 days to allow Owner to schedule and access system and to upgrade computer equipment if necessary.

3.16 DEMONSTRATION

A. Engage a factory-authorized service representative with complete knowledge of Project-specific system installed to train Owner's maintenance personnel to adjust, operate, and maintain DDC system.

B. Extent of Training:

1. Base extent of training on scope and complexity of DDC system indicated and training requirements indicated. Provide extent of training required to satisfy requirements indicated even if more than minimum training requirements are indicated.
2. Inform Owner of anticipated training requirements if more than minimum training requirements are indicated.
3. Minimum Training Requirements:

    a. Stagger training over multiple training classes to accommodate Owner's requirements. All training shall occur before end of warranty period.
    b. Total days of training shall be broken into not more than two separate training classes.
    c. Each training class shall be not less than one day.

C. Training Schedule:

1. Schedule training with Owner 20 business days before expected Substantial Completion.
2. Schedule training to provide Owner with at least 10 business days of notice in advance of training.
3. Provide staggered training schedule as requested by Owner.

D. Training Attendee List and Sign-in Sheet:

1. Request from Owner in advance of training a proposed attendee list with name, phone number and e-mail address.
2. Provide a preprinted sign-in sheet for each training session with proposed attendees listed and no fewer than six blank spaces to add additional attendees.
3. Preprinted sign-in sheet shall include training session number, date and time, instructor name, phone number and e-mail address, and brief description of content to be covered during session. List attendees with columns for name, phone number, e-mail address and a column for attendee signature or initials.
4. Circulate sign-in sheet at beginning of each session and solicit attendees to sign or initial in applicable location.
5. At end of each training day, send Owner an e-mail with an attachment of scanned copy (PDF) of circulated sign-in sheet for each session.

E. Attendee Training Manuals:

1. Provide each attendee with a color hard copy of all training materials and visual presentations.
2. Hard-copy materials shall be organized in a three-ring binder with table of contents and individual divider tabs marked for each logical grouping of subject matter. Organize material to provide space for attendees to take handwritten notes within training manuals.
3. In addition to hard-copy materials included in training manual, provide each binder with a sleeve or pocket that includes a DVD or flash drive with PDF copy of all hard-copy materials.

F. Instructor Requirements:

1. One or multiple qualified instructors, as required, to provide training.

2. Instructors shall have not less than five years of providing instructional training on not less than five past projects with similar DDC system scope and complexity to DDC system installed.

G. Organization of Training Sessions:

1. Organize training sessions into logical groupings of technical content and to reflect different levels of operators having access to system. Plan training sessions to accommodate the following three levels of operators:

   a. Daily operators.
   b. Advanced operators.
   c. System managers and administrators.

2. Plan and organize training sessions to group training content to protect DDC system security. Some attendees may be restricted to some training sessions that cover restricted content for purposes of maintaining DDC system security.

H. Training Outline:

1. Submit training outline for Owner review at least 10 business day before scheduling training.
2. Outline shall include a detailed agenda for each training day that is broken down into each of four training sessions that day, training objectives for each training session and synopses for each lesson planned.

I. On-Site Training:

1. Owner will provide conditioned classroom or workspace with ample desks or tables, chairs, power and data connectivity for instructor and each attendee.
2. Instructor shall provide training materials, projector and other audiovisual equipment used in training.
3. Provide as much of training located on-site as deemed feasible and practical by Owner.
4. On-site training shall include regular walk-through tours, as required, to observe each unique product type installed with hands-on review of operation, calibration and service requirements.
5. Operator workstation provided with DDC system shall be used in training. If operator workstation is not indicated, provide a temporary workstation to convey training content.

J. Training Content for Daily Operators:

1. Basic operation of system.
2. Understanding DDC system architecture and configuration.
3. Understanding each unique product type installed including performance and service requirements for each.
4. Understanding operation of each system and equipment controlled by DDC system including sequences of operation, each unique control algorithm and each unique optimization routine.
5. Operating operator workstations, printers and other peripherals.
6. Logging on and off system.
7. Accessing graphics, reports and alarms.

8. Adjusting and changing set points and time schedules.
9. Recognizing DDC system malfunctions.
10. Understanding content of operation and maintenance manuals including control drawings.
11. Understanding physical location and placement of DDC controllers and I/O hardware.
12. Accessing data from DDC controllers.
13. Operating portable operator workstations.
14. Review of DDC testing results to establish basic understanding of DDC system operating performance and HVAC system limitations as of Substantial Completion.
15. Running each specified report and log.
16. Displaying and demonstrating each data entry to show Project-specific customizing capability. Demonstrating parameter changes.
17. Stepping through graphics penetration tree, displaying all graphics, demonstrating dynamic updating, and direct access to graphics.
18. Executing digital and analog commands in graphic mode.
19. Demonstrating control loop precision and stability via trend logs of I/O for not less than 10 percent of I/O installed.
20. Demonstrating DDC system performance through trend logs and command tracing.
21. Demonstrating scan, update, and alarm responsiveness.
22. Demonstrating spreadsheet and curve plot software, and its integration with database.
23. Demonstrating on-line user guide and help function and mail facility.
24. Demonstrating multitasking by showing dynamic curve plot, and graphic construction operating simultaneously via split screen.
25. Demonstrating the following for HVAC systems and equipment controlled by DDC system:

    a. Operation of HVAC equipment in normal-off, -on and failed conditions while observing individual equipment, dampers and valves for correct position under each condition.
    b. For HVAC equipment with factory-installed software, show that integration into DDC system is able to communicate with DDC controllers or gateways, as applicable.
    c. Using graphed trends, show that sequence of operation is executed in correct manner, and HVAC systems operate properly through complete sequence of operation including seasonal change, occupied and unoccupied modes, warm-up and cool-down cycles and other modes of operation indicated.
    d. Hardware interlocks and safeties function properly and DDC system performs correct sequence of operation after electrical power interruption and resumption after power is restored.
    e. Reporting of alarm conditions for each alarm, and confirm that alarms are received at assigned locations, including operator workstations.
    f. Each control loop responds to set point adjustment and stabilizes within time period indicated.
    g. Sharing of previously graphed trends of all control loops to demonstrate that each control loop is stable and set points are being maintained.

K. Training Content for Advanced Operators:

1. Making and changing workstation graphics.
2. Creating, deleting and modifying alarms including annunciation and routing.

3. Creating, deleting and modifying point trend logs including graphing and printing on an ad-hoc basis and operator-defined time intervals.
4. Creating, deleting and modifying reports.
5. Creating, deleting and modifying points.
6. Creating, deleting and modifying programming including ability to edit control programs off-line.
7. Creating, deleting and modifying system graphics and other types of displays.
8. Adding operator workstations.
9. Performing DDC system checkout and diagnostic procedures.
10. Performing DDC controllers operation and maintenance procedures.
11. Performing operator workstation operation and maintenance procedures.
12. Configuring DDC system hardware including controllers, workstations, communication devices and I/O points.
13. Maintaining, calibrating, troubleshooting, diagnosing and repairing hardware.
14. Adjusting, calibrating and replacing DDC system components.

L. Training Content for System Managers and Administrators:

1. DDC system software maintenance and backups.
2. Uploading, downloading and off-line archiving of all DDC system software and databases.
3. Interface with Project-specific, third-party operator software.
4. Understanding password and security procedures.
5. Adding new operators and making modifications to existing operators.
6. Operator password assignments and modification.
7. Operator authority assignment and modification.
8. Workstation data segregation and modification.

M. Video of Training Sessions:

1. Provide a digital video and audio recording of each training session. Create a separate recording file for each session.
2. Stamp each recording file with training session number, session name and date.
3. Provide Owner with two copies of digital files for later reference and for use in future training.
4. Owner retains right to make additional copies for intended training purposes without having to pay royalties.

END OF SECTION 230923

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SECTION 233113 - METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Double-wall rectangular ducts and fittings.
3. Single-wall round ducts and fittings.
4. Double-wall round ducts and fittings.
5. Sheet metal materials.
6. Sealants and gaskets.
7. Hangers and supports.
8. Seismic-restraint devices.
9. Delegated Design.

B. Related Sections:

1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 DEFINITIONS

A. OSHPD: Office of Statewide Health Planning and Development (State of California).

1.4 ACTION SUBMITTALS

A. Product Data: For each type of the following products:

1. Adhesives.
2. Sealants and gaskets.
3. Seismic-restraint devices.

B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.

2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
4. Elevation of top and bottom of ducts.
5. Dimensions of all duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Penetrations through fire-rated and other partitions.
10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
12. Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation.

1.5 DELEGATED DESIGN SUBMITTALS

A. Sheet metal thicknesses.

B. Joint and seam construction and sealing.

C. Reinforcement details and spacing.

D. Materials, fabrication, assembly, and spacing of hangers and supports.

E. Design Calculations: Calculations, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation for selecting hangers and supports and seismic restraints.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: A single set of plans or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.

B. Welding certificates.

C. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D9.1/D9.1M, "Sheet Metal Welding Code," for duct joint and seam welding.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Duct Design: Engage a qualified professional engineer, as defined in Section 014000 “Quality Requirements” to design the following:

1. Ensure duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and with performance requirements and design criteria indicated in "Duct Schedule" Article.

B. Structural Performance: Duct hangers and supports and seismic restraints shall withstand the effects of gravity, wind and seismic loads defined in Sections 018829 and 018839 within limits and under conditions to comply with ASCE/SEI 7 and SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems - OSHPD Edition."

C. Duct Dimensions: Unless otherwise indicated, all duct dimensions indicated on Drawings are inside clear dimensions and do not include insulation or duct wall thickness.

2.2 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

1. Construct ducts of galvanized sheet steel unless otherwise indicated.
2. For ducts exposed to weather, construct of Type 316 stainless steel indicated by manufacturer to be suitable for outdoor installation.

B. Transverse Joints: Fabricate joints in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. For ducts with longest side less than 36 inches, select joint types in accordance with Figure 2-1.
2. For ducts with longest side 36 inches or greater, use flange joint connector Type T-22, T-24, T-24A, T-25a, or T-25b. Factory-fabricated flanged duct connection system may be used if submitted and approved by engineer of record.

C. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." Verify all longitudinal seams are Pittsburgh lock seams unless otherwise specified for specific application.

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 DOUBLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. Rectangular Ducts: Fabricate ducts with indicated dimensions for clear internal dimensions of the inner duct.

B. Outer Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

1. For ducts exposed to weather, construct outer duct of Type 316 stainless steel indicated by manufacturer to be suitable for outdoor installation.

C. Transverse Joints: Select joint types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. For ducts with longest side less than 36 inches, select joint types in accordance with Figure 2-1.
2. For ducts with longest side 36 inches or greater, use flange joint connector Type T-22, T-24, T-24A, T-25a, or T-25b. Factory-fabricated flanged duct connection system may be used if submitted and approved by engineer of record.

D. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

E. Interstitial Insulation: Fibrous-glass liner complying with ASTM C1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

1. Maximum Thermal Conductivity: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
2. Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
3. Cover insulation with polyester film complying with UL 181, Class 1.

F. Inner Duct: Minimum 24-gauge solid galvanized sheet steel.

2.4 SINGLE-WALL ROUND DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

1. Construct ducts of galvanized sheet steel unless otherwise indicated.
2. For ducts exposed to weather, construct of Type 316 stainless steel indicated by manufacturer to be suitable for outdoor installation.

B. Transverse Joints: Select joint types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.

C. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
2. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.

D. Tees and Laterals: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.5 DOUBLE-WALL ROUND DUCTS AND FITTINGS

A. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension) of the inner duct.

1. Outer Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 3, "Round, Oval, and Flexible Duct," based on static-pressure class unless otherwise indicated.

    a. Construct ducts of galvanized sheet steel unless otherwise indicated.
    b. For ducts exposed to weather, construct outer duct of Type 316 stainless steel indicated by manufacturer to be suitable for outdoor installation.

2. Transverse Joints: Select joint types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct

Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

a. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.

3. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

a. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
b. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.

4. Tees and Laterals: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Inner Duct: Minimum 24-gauge solid galvanized sheet steel.

C. Interstitial Insulation: Fibrous-glass liner complying with ASTM C1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

1. Maximum Thermal Conductivity: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
2. Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
3. Cover insulation with polyester film complying with UL 181, Class 1.

2.6 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Ensure sheet metal materials are free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A653/A653M.

1. Galvanized Coating Designation: G60.
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Stainless Steel Sheets: Comply with ASTM A480/A480M, Type 304 or 316, as indicated in "Duct Schedule" Article; cold rolled, annealed, sheet. Verify exposed surface finish is No. 2B, No. 2D, No. 3, or No. 4 as indicated in "Duct Schedule" Article.

D. Reinforcement Shapes and Plates: ASTM A36/A36M, steel plates, shapes, and bars; black and galvanized.

1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

E. Tie Rods: Galvanized steel, 1/4-inch- minimum diameter for lengths 36 inches or less; 3/8-inch-minimum diameter for lengths longer than 36 inches.

2.7 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Verify surface-burning characteristics for sealants and gaskets have a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.

B. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: 6 inches.
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
10. Sealant: has a VOC content of 420 g/L or less.
11. Sealant complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Solvent-Based Joint and Seam Sealant:

1. Application Method: Brush on.

2. Base: Synthetic rubber resin.
3. Solvent: Toluene and heptane.
4. Solids Content: Minimum 60 percent.
5. Shore A Hardness: Minimum 60.
6. Water resistant.
7. Mold and mildew resistant.
8. Sealant: has a VOC content of 420 g/L or less.
9. Sealant complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
10. Maximum Static-Pressure Class: 10-inch wg, positive or negative.
11. Service: Indoor or outdoor.
12. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

E. Flanged Joint Sealant: Comply with ASTM C920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. Sealant: has a VOC content of 420 g/L or less.
7. Sealant complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

F. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

G. Round Duct Joint O-Ring Seals:

1. Seal provides maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and is rated for10-inch wg static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.8 HANGERS AND SUPPORTS

A. Hanger Rods: Stainless-steel rods and nuts.

B. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

C. Cables for Galvanized-Steel Ducts: Stainless steel complying with ASTM A603.

D. Cables for Stainless Steel Ducts: Stainless steel complying with ASTM A492.

E. Steel Cable End Connections: Stainless-steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

F. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

G. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless Steel Ducts: Stainless steel shapes and plates.

2.9 SEISMIC-RESTRAINT DEVICES

A. General Requirements for Restraint Components: Rated strengths, features, and applications as defined in reports by OSHPD, in State of California.

1. Structural Safety Factor: Ensure allowable strength in tension, shear, and pullout force of components is at least four times the maximum seismic forces to which they will be subjected.

B. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.

C. Restraint Cables: ASTM A492, stainless steel cables with end connections made of galvanized-steel assemblies with brackets, swivel, and bolts designed for restraining cable service; and with an automatic-locking and clamping device or double-cable clips.

D. Hanger Rod Stiffener: Reinforcing steel angle clamped to hanger rod.

E. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested in accordance with ASTM E488/E488M.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and coordination drawings.

B. Install ducts in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install ducts in maximum practical lengths with fewest possible joints.

D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

I. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.

J. Install fire and smoke dampers where indicated on Drawings and as required by code, and by local authorities having jurisdiction. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers and specific installation requirements of the damper UL listing.

K. Install heating coils, cooling coils, air filters, dampers, and all other duct-mounted accessories in air ducts where indicated on Drawings.

L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials both before and after installation.

M. Elbows: Use long-radius elbows wherever they fit.

N. Branch Connections: Use lateral or conical branch connections.

3.2 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

D. Maintain consistency, symmetry, and uniformity in arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 ADDITIONAL INSTALLATION REQUIREMENTS FOR LABORATORY EXHAUST AND FUME HOOD EXHAUST DUCTS

A. Install ducts in accordance with NFPA 45, "Fire Protection for Laboratories Using Chemicals."

B. Install exhaust ducts without dips and traps that may hold water. Slope ducts a minimum of 2 percent back to hood or inlet. Where indicated on Drawings, install trapped drain piping.

C. Connect duct to fan, fume hood, and other equipment indicated on Drawings.

3.4 DUCTWORK EXPOSED TO WEATHER

A. All external joints are to be welded. Seal all openings to provide weatherproof construction.

B. Construct ductwork to resist external loads of wind, snow, ice, and other effects of weather. Provide necessary supporting structures.

C. Single Wall:

1. Ductwork shall be Type 316 stainless steel.

2. Where ducts have external insulation, provide weatherproof aluminum jacket. See Section 230713 "Duct Insulation."

D. Double Wall:

1. Ductwork shall comply with requirements in "Double-Wall Rectangular Ducts and Fittings" or "Double-Wall Round Ducts and Fittings" Article.
2. Ductwork outer wall shall be Type 316 stainless steel indicated by manufacturer to be suitable for outdoor installation.
3. Provide interstitial insulation.

3.5 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Seal ducts at a minimum to the following seal classes in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Outdoor, Supply-Air Ducts: Seal Class A.
3. Outdoor, Exhaust Ducts: Seal Class C.
4. Outdoor, Return-Air Ducts: Seal Class C.
5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-inch wg and Lower: Seal Class B.
6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher than 2-inch wg: Seal Class A.
7. Unconditioned Space, Exhaust Ducts: Seal Class C.

8. Unconditioned Space, Return-Air Ducts: Seal Class B.
9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-inch wg and Lower: Seal Class C.
10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher than 2-inch wg: Seal Class B.
11. Conditioned Space, Exhaust Ducts: Seal Class B.
12. Conditioned Space, Return-Air Ducts: Seal Class C.

3.6 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
5. Do not use powder-actuated concrete fasteners for seismic restraints.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at maximum intervals of 16 feet.

F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.7 SEISMIC-RESTRAINT-DEVICE INSTALLATION

A. Install ducts with hangers and braces designed to support the duct and to restrain against seismic forces required by applicable building codes. Comply with SMACNA's "Seismic Restrain Manual: Guidelines for Mechanical Systems - OSHPD Edition."

1. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
2. Brace a change of direction longer than 12 feet.

B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.

C. Install cables so they do not bend across edges of adjacent equipment or building structure.

D. Install cable restraints on ducts that are suspended with vibration isolators.

E. Install seismic-restraint devices using methods approved by OSHPD.

F. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.

G. Drilling for and Setting Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify Engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Set anchors to manufacturer's recommended torque, using a torque wrench.
5. Install zinc-coated steel anchors for interior applications and stainless steel anchors for applications exposed to weather.

3.8 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.9 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Leakage Tests:

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
2. Test all systems
3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.

4. Testing of each duct section is to be performed with access doors, coils, filters, dampers, and other duct-mounted devices in place as designed. No devices are to be removed or blanked off so as to reduce or prevent additional leakage.
5. Test for leaks before applying external insulation.
6. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
7. Give seven days' advance notice for testing.

C. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.
2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness in accordance with "Description of Method 3 - NADCA Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."

    a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media not to exceed 0.75 mg/100 sq. cm.

D. Duct system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.10 DUCT CLEANING

A. Clean new duct system(s) before testing, adjusting, and balancing.

B. For cleaning of existing ductwork, see Section 230130.52 "Existing HVAC Air Distribution System Cleaning."

C. Use duct cleaning methodology as indicated in NADCA ACR.

D. Use service openings for entry and inspection.

1. Provide openings with access panels appropriate for duct static-pressure and leakage class at dampers, coils, and any other locations where required for inspection and cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
3. Remove and reinstall ceiling to gain access during the cleaning process.

E. Particulate Collection and Odor Control:

1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

F. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

G. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. Clean coils and coil drain pans in accordance with NADCA ACR. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents in accordance with manufacturer's written instructions after removal of surface deposits and debris.

3.11 STARTUP

A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.12 DUCT SCHEDULE

A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:

1. Fabricate all ducts to achieve SMACNA pressure class, seal class, and leakage class as indicated below.

B. Supply Ducts:

1. Ducts Connected to Terminal Units:

    a. Pressure Class: Positive 2-inch wg.
    b. Minimum SMACNA Seal Class: C.
    c. SMACNA Leakage Class for Rectangular: 16.
    d. SMACNA Leakage Class for Round and Flat Oval: 8.

2. Ducts Connected to Constant-Volume Air-Handling Units:

    a. Pressure Class: Positive 3-inch wg.
    b. Minimum SMACNA Seal Class: B.
    c. SMACNA Leakage Class for Rectangular: 8.
    d. SMACNA Leakage Class for Round: 4.

3. Ducts Connected to Variable-Air-Volume Air-Handling Units:

    a. Pressure Class: Positive 4-inch wg.
    b. Minimum SMACNA Seal Class: A.
    c. SMACNA Leakage Class for Rectangular: 4.
    d. SMACNA Leakage Class for Round: 2.

4. Ducts Connected to Equipment Not Listed Above:

    a. Pressure Class: Positive 4-inch wg.
    b. Minimum SMACNA Seal Class: A.
    c. SMACNA Leakage Class for Rectangular: 4.
    d. SMACNA Leakage Class for Round: 2.

C. Return Ducts:

1. Ducts Connected to Air-Handling Units:

    a. Pressure Class: Positive or negative 2-inch wg.
    b. Minimum SMACNA Seal Class: C.
    c. SMACNA Leakage Class for Rectangular: 16.
    d. SMACNA Leakage Class for Round: 8.

2. Ducts Connected to Equipment Not Listed above:

    a. Pressure Class: Positive or negative 2-inch wg.
    b. Minimum SMACNA Seal Class: C.
    c. SMACNA Leakage Class for Rectangular: 16.
    d. SMACNA Leakage Class for Round: 8.

D. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:

    a. Pressure Class: Negative 3-inch wg.
    b. Minimum SMACNA Seal Class: B if negative pressure, and A if positive pressure.

c. SMACNA Leakage Class for Rectangular: 8.
d. SMACNA Leakage Class for Round: 4.

2. Ducts Connected to Fans Exhausting Fume Hood, Laboratory, and Process (ASHRAE 62.1, Class 3 and Class 4) Air:

a. Type 316, stainless steel sheet.

1) Exposed to View: No. 4 finish.
2) Concealed: No. 2B finish.

b. Pressure Class: Positive or negative 4-inch wg.
c. Welded seams and joints.

E. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel.

2. Stainless Steel Ducts:

a. Exposed to Airstream: Match duct material.
b. Not Exposed to Airstream: Match duct material.

F. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

a. Velocity 1000 fpm or Lower:

1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
2) Mitered Type RE 4 without vanes.

b. Velocity 1000 to 1500 fpm:

1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

c. Velocity 1500 fpm or Higher:

1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

    a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
    b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
    c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."

    a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.

        1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
        2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
        3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
        4) Radius-to Diameter Ratio: 1.5.

    b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
    c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam.

G. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."

    a. Rectangular Main to Rectangular Branch: 45-degree entry.
    b. Rectangular Main to Round Branch: Conical spin in.

2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.

    a. Velocity 1000 fpm or Lower: 90-degree tap.
    b. Velocity 1000 to 1500 fpm: Conical tap.
    c. Velocity 1500 fpm or Higher: 45-degree lateral.

END OF SECTION 233113

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SECTION 233300 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Manual volume dampers.
2. Control dampers.
3. Fire dampers.
4. Flange connectors.
5. Turning vanes.
6. Remote damper operators.
7. Flexible connectors.
8. Duct accessory hardware.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For duct silencers, include pressure drop and dynamic insertion loss data. Include breakout noise calculations for high transmission loss casings.

B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.

1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:

a. Special fittings.
b. Manual volume damper installations.
c. Control-damper installations.
d. Fire-damper, smoke-damper, combination fire- and smoke-damper, ceiling, and corridor damper installations, including sleeves; and duct-mounted access doors and remote damper operators.
e. Duct security bars.
f. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.

B. Source quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUAL VOLUME DAMPERS

A. Low-Leakage, Steel, Manual Volume Dampers:

1. Comply with AMCA 500-D testing for damper rating.
2. Low-leakage rating, with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
3. Suitable for horizontal or vertical applications.
4. Frames:

a. Hat shaped.
b. 0.094-inch- thick, galvanized sheet steel.
c. Mitered and welded corners.
d. Flanges for attaching to walls and flangeless frames for installing in ducts.

5. Blades:

a. Multiple or single blade.
b. Parallel- or opposed-blade design.
c. Stiffen damper blades for stability.
d. Galvanized, roll-formed steel, 0.064 inch thick.

6. Blade Axles: Stainless steel.

7. Bearings:

    a. Stainless steel sleeve.
    b. Ensure dampers in ducts with pressure classes of 3-inch wg or less have axles full length of damper blades and bearings at both ends of operating shaft.

8. Blade Seals: Neoprene.
9. Jamb Seals: Cambered stainless steel.
10. Tie Bars and Brackets: Galvanized steel.
11. Accessories:

    a. Include locking device to hold single-blade dampers in a fixed position without vibration.

B. Damper Hardware:

1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch- thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

2.2 CONTROL DAMPERS

A. Low-leakage rating, with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.

B. Frames:

1. Hat shaped.
2. 0.05-inch- thick stainless steel.
3. Mitered and welded corners.

C. Blades:

1. Multiple blade with maximum blade width of 6 inches.
2. Parallel- and opposed-blade design.
3. Galvanized-steel.
4. 0.064 inch thick single skin.
5. Blade Edging: Closed-cell neoprene.
6. Blade Edging: Inflatable seal blade edging, or replaceable rubber seals.

D. Blade Axles: 1/2-inch-diameter; stainless steel; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.

1. Operating Temperature Range: From minus 40 to plus 200 deg F.

E. Bearings:

1. Oil-impregnated stainless steel sleeve.

2. Ensure dampers in ducts with pressure classes of 3-inch wg or less have axles full length of damper blades and bearings at both ends of operating shaft.
3. Thrust bearings at each end of every blade.

2.3 FIRE DAMPERS

A. Type: dynamic; rated and labeled according to UL 555 by an NRTL.

B. Closing rating in ducts up to 4-inch wg static pressure class and minimum 2000-fpm velocity.

C. Fire Rating: 1-1/2 hours.

D. Frame: Curtain type with blades outside airstream; fabricated with roll-formed, galvanized steel; with mitered and interlocking corners; gauge in accordance with UL listing.

E. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel; gauge in accordance with UL listing.

F. Mounting Orientation: Vertical or horizontal as indicated.

G. Blades: Roll-formed, interlocking, galvanized sheet steel; gauge in accordance with UL listing.

H. Horizontal Dampers: Include blade lock and stainless steel closure spring.

I. Heat-Responsive Device: Replaceable, 165 deg F rated, fusible links.

J. Heat-Responsive Device: Electric, link and switch package, factory installed, 165 deg F rated.

2.4 DUCT SMOKE DETECTORS FOR UNCLASSIFIED AIR

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or equal:

1. Air Products and Controls.
2. System Sensor.

B. Type: UL or CSA listed, photoelectric.

C. Housing: Refer to Materials of Construction Schedule.

D. Sampling Tube Material: Galvanized steel for galvanized steel ducts. Aluminum for aluminum ducts.

E. Operating Voltage: 115 VAC, 24 VAC, or 24 VDC.

F. Relay Contacts: Alarm condition, trouble condition, and equipment shutdown.

2.5 DUCT SMOKE DETECTORS FOR CLASSIFIED FOUL AIR

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or equal:

1. Det-Tronics.

B. Type: UL or CSA listed, photoelectric.

C. Rating: Class 1 Division 1 Group C.

D. Housing: IP44.

E. Operating Voltage: 24 VDC.

F. Relay Contacts: Alarm condition, trouble condition, and equipment shutdown.

G. Duct-mount Accessory:

1. Housing: NEMA 4X.
2. Body Material: Aluminum.
3. Mounting Plate Material: Aluminum.
4. Fastener Material: Stainless steel.
5. Sampling Tube Material: Aluminum or Type 316 stainless steel.
6. Sampling Tube Length: Coordinate with duct diameter. Cut to match duct diameter.

2.6 FLANGE CONNECTORS

A. Description: Add-on, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.

B. Material: Galvanized steel.

C. Gauge and Shape: Match connecting ductwork.

2.7 TURNING VANES

A. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

B. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."

D. Vane Construction: Single wall for ducts up to 48 inches wide and double wall for larger dimensions.

2.8 REMOTE DAMPER OPERATORS

A. Description: Cable system designed for remote manual damper adjustment.

B. Tubing: Brass.

C. Cable: Stainless steel.

D. Wall-Box Mounting: Recessed.

E. Wall-Box Cover-Plate Material: Stainless steel.

2.9 DUCT ACCESS PANEL ASSEMBLIES

A. Labeled according to UL 1978 by an NRTL.

B. Panel and Frame: Minimum thickness 0.0428-inch stainless steel.

C. Fasteners: Stainless steel. Ensure panel fasteners do not penetrate duct wall.

D. Gasket: Comply with NFPA 96; grease-tight, high-temperature ceramic fiber, rated for minimum 2000 deg F.

E. Minimum Pressure Rating: 10-inch wg, positive or negative.

2.10 FLEXIBLE CONNECTORS

A. Materials: Flame-retardant or noncombustible fabrics.

B. Coatings and Adhesives: Comply with UL 181, Class 1.

C. Metal-Edged Connectors: Factory fabricated with a fabric strip 5-3/4 inches wide attached to two strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Provide metal compatible with connected ducts.

D. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd..
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F.

E. High-Corrosive-Environment System, Flexible Connectors: Glass fabric with chemical-resistant coating.

1. Minimum Weight: 14 oz./sq. yd..
2. Tensile Strength: 450 lbf/inch in the warp and 340 lbf/inch in the filling.

3. Service Temperature: Minus 67 to plus 500 deg F.

F. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.

1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch movement at start and stop.

2.11 DUCT ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless steel accessories in stainless steel ducts, and aluminum accessories in aluminum ducts.

C. Install backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.

D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.

1. Install steel volume dampers in steel ducts.
2. Install aluminum volume dampers in aluminum ducts.

E. Set dampers to fully open position before testing, adjusting, and balancing.

F. Install test holes at fan inlets and outlets and elsewhere as indicated.

G. Install fire dampers according to UL listing.

H. Install duct security bars. Construct duct security bars from 0.164-inchsteel sleeve, continuously welded at all joints and 1/2-inch- diameter steel bars, 6 inches o.c. in each direction in center of sleeve. Weld each bar to steel sleeve and each crossing bar. Weld 2-1/2-by-2-1/2-by-1/4-inch steel angle to 4 sides and both ends of sleeve. Connect duct security bars to ducts with flexible connections. Provide 12-by-12-inch hinged access panel with cam lock in duct in each side of sleeve.

I. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:

1. On both sides of duct coils.
2. Upstream from duct filters.
3. At outdoor-air intakes and mixed-air plenums.
4. At drain pans and seals.
5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links are pressure relief access doors; outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
7. At each change in direction and at maximum 50-foot spacing.
8. Upstream from turning vanes.
9. Upstream or downstream from duct silencers.
10. Control devices requiring inspection.
11. Elsewhere as indicated.

J. Install access doors with swing against duct static pressure.

K. Access Door Sizes:

1. One-Hand or Inspection Access: 8 by 5 inches.
2. Two-Hand Access: 12 by 6 inches.
3. Head and Hand Access: 18 by 10 inches.
4. Head and Shoulders Access: 21 by 14 inches.
5. Body Access: 25 by 14 inches.
6. Body plus Ladder Access: 25 by 17 inches.

L. Label access doors according to Section 230553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.

M. Install flexible connectors to connect ducts to equipment.

N. For fans developing static pressures of 5-inch wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.

O. Connect diffusers to ducts with maximum 60-inch lengths of flexible duct clamped or strapped in place.

P. Connect flexible ducts to metal ducts with draw bands.

Q. Install duct test holes where required for testing and balancing purposes.

R. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop of fans.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.
5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION 233300

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SECTION 233423 - HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Ceiling-mounted ventilators.
2. Centrifugal ventilators
3. High-Plume Dilution Laboratory Exhaust System

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes for fans.
2. Rated capacities, operating characteristics, and furnished specialties and accessories.
3. Certified fan performance curves with system operating conditions indicated.
4. Certified fan sound-power ratings.
5. Motor ratings and electrical characteristics, plus motor and electrical accessories.
6. Material thickness and finishes, including color charts.
7. Dampers, including housings, linkages, and operators.
8. Prefabricated roof curbs.
9. Fan speed controllers.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For HVAC power ventilators to include in normal and emergency, operation, and maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Belts: One set(s) for each belt-driven unit.

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PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 CEILING-MOUNTED VENTILATORS

A. Housing: Steel, lined with acoustical insulation.

B. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel removable for service.

C. Back-draft damper: Integral.

D. Grille: Plastic, louvered grille with flange on intake and thumbscrew or spring retainer attachment to fan housing.

E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.

F. Accessories:

1. Manual Starter Switch: Single-pole rocker switch assembly with cover and pilot light.
2. Isolation: Rubber-in-shear vibration isolators.
3. Manufacturer's standard roof wall cap, and transition fittings.

2.3 CENTRIFUGAL VENTILATORS - ROOF DOWNBLAST

A. Housing: Downblast; removable spun-aluminum dome top and outlet baffle; square, one-piece aluminum base with venturi inlet cone.

B. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.

C. Belt Drives:

1. Resiliently mounted to housing.
2. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
3. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
4. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
5. Motor Pulleys: Adjustable pitch for use with motors through 5 hp. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions. Provide fixed pitch for use with motors larger than 5 hp.
6. Fan and motor isolated from exhaust airstream.

D. Accessories:

1. Variable-Frequency Motor Controller: Solid-state control to reduce speed from 100 to less than 50 percent.

2. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted outside fan housing, factory wired through an internal aluminum conduit.
3. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
4. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.

E. Prefabricated Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inch- thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to suit roof opening and fan base.

1. Configuration: Built-in raised cant and mounting flange.
2. Overall Height: 12 inches.
3. Hinged sub-base to provide access to damper or as cleanout for grease applications.
4. Pitch Mounting: Manufacture curb for roof slope.

2.4 HIGH-PLUME DILUTION LABORATORY EXHASUT SYSTEM

A. General:

1. Base fan performance at standard conditions (density 0.075 Lb. /ft³).
2. Fans selected shall be capable of accommodating static pressure and flow variations of +/- 15% of scheduled values.
3. Each fan shall be belt driven in AMCA arrangement 9.
4. Each fan to be equipped with 316 stainless steel lifting lugs for corrosion resistance.
5. Fasteners exposed to corrosive exhaust shall be 316 stainless steel.
6. Curb cap shall be 316 stainless steel.
7. Fan assemblies that use flexible connectors that can fail, and cause loss of laboratory containment shall not be acceptable.
8. Fan assembly shall be designed for a minimum of 125-mph wind loading, without the use of guy wires.
9. Motor cover shall be hinged with removable side panels for ease of maintenance to allow the servicing of the motor and drive.
10. Pitch Mounting: Manufacture curb for roof slope.

B. Corrosion Resistant Coating:

1. All steel fan and system components (fan, nozzle, windband and plenum) shall be corrosion resistant coated with electrostatically applied and baked, sustainable, corrosion-resistant coating system.

2. All parts shall be cleaned and chemically prepared for coating using a multistage wash system which includes acid pickling to remove oxide, improving the coating bond to the substrate.

3. The first powder coat applied over the prepared surface shall be an epoxy primer. After application, the coating shall be heated to a gelatinous consistency (partial cure) at which time the second powder coat of polyester resin shall be electrostatically applied and then be cured simultaneously at a uniform temperature of 400°F (204°C).

4. The coating system shall not be less than a total thickness of 6 mils, shall not be affected by the UV component of sunlight (does not chalk), and have superior corrosion resistance to acid, alkali, and solvents. Coating system shall exceed 4000-hour ASTM B117 Salt Spray Resistance.

C. Fan Housing and Outlet:

1. Fan housing shall be aerodynamically designed with high-efficiency inlet, engineered to reduce incoming air turbulence.
2. Fan housing shall be bifurcated, allowing all drive components, including the motor, to be serviced without contact of the contaminated airstream. Must be manufactured of welded steel and meet specification section 2.4.B for corrosion resistant coating. No uncoated metal fan parts will be acceptable.
3. Fan housings that are fabricated of polypropylene or fiberglass that have lower mechanical properties than steel, have rough interior surfaces in which corrosive, hazardous compounds can collect, and / or which chalk and structurally degrade due to the UV component of the sunlight shall not be acceptable.
4. A multi-stage air induction discharge nozzle shall be supplied by the fan manufacturer be designed to efficiently handle an outlet velocity of up to 7000 FPM. The multi-stage nozzle shall induce ambient air up to 270% of fan capacity. Nozzle / windband assemblies that are manufactured by third party vendors or that are fabricated of plastic or resins, having mechanical properties less than steel shall not be acceptable.
5. An integral fan housing drain shall be used to drain rainwater when the fan is de-energized.
6. An access door shall be supplied for impeller inspection and service.
7. Fan assembly shall be AMCA type C spark resistant construction minimum.

D. Fan Impeller:

1. Fan impeller shall be mixed flow design with non-stall characteristics. The impeller shall be electronically balanced both statically and dynamically exceeding AMCA Standards.
2. Fan impeller shall be manufactured of welded and coated steel. Reference specification section 2.4.B for corrosion resistant coating.
3. Fan impellers that are fabricated of polypropylene or fiberglass that have lower mechanical properties than steel and lower maximum tip speeds are not acceptable.
4. Vacuum Seal: Fan impeller shall include a secondary fan blade located on the impeller back plate. This secondary impeller shall create a negative pressure at the shaft opening; preventing hazardous or toxic exhaust fumes from escaping through the housing shaft opening. Mechanical shaft seals that wear out and need to be replaced or seal systems that use hoses or tubes that can leak, are not acceptable.

E. Bypass Air Plenum:

1. For variable volume systems, a bypass air plenum shall be provided. The plenum shall be provided with bypass air damper(s) for introducing outside air at roof level upstream of the fan, complete with bypass air weatherhood and bird screen.
2. The plenum shall be constructed of welded and coated steel and meet specification section 2.4.B for corrosion resistant coating. Plenums that are fabricated of plastics or resins that are combustible and have mechanical properties less than steel shall not be acceptable.

3. The bypass air plenum shall be mounted on factory fabricated roof curb provided by the fan manufacturer.
4. Fan designs that use inlet flexible connectors that can leak causing loss of lab exhaust shall not be permitted.
5. Bypass Air Damper(s):

    a. Opposed-blade design for airflow control, airfoil design, fabricated of 316 stainless steel for structural rigidity as standard.
    b. Bypass damper(s) shall have plated steel damper rods, stainless steel sleeved bearings, 301 stainless steel jamb seals and the blades shall have polymer edge seals.
    c. Damper model shall be equal to or exceed a heavy-duty control damper, Greenheck HCD-130.
    d. Damper blade drive linkage shall be set by manufacturer and welded to eliminate linkage slippage.
    e. All damper access and service (drive actuators) shall be performed outside of the contaminated airstream.

6. Fan Isolation Damper(s):

    a. Parallel-blade design, airfoil design, fabricated of 304 stainless steel construction for structural rigidity as standard.
    b. Isolation damper(s) shall have 304 stainless steel damper, stainless steel sleeved bearings, 301 stainless steel jamb seals and the blades shall have polymer edge seals.
    c. Damper model shall be equal to or exceed a heavy-duty control damper, Greenheck HCD-130.
    d. Damper blade drive linkage shall be set by manufacturer and welded to eliminate linkage slippage.
    e. All damper access and service (drive actuators) shall be performed outside of the contaminated airstream.

7. Isolation damper actuator(s) shall be factory mounted and shall be wired to a step-down transformer. Actuator and transformer are located in a weatherproof enclosure.
8. Blower / Plenum vibration isolation shall be limited to neoprene / cork vibration pads.

F. Bypass Air Plenum:

1. Exhaust system manufacturer shall supply a structural support curb for the plenum of specified height as shown on the drawings.
2. Curb shall be fabricated of a minimum of 12-gauge corrosion-resistant coated steel and structurally reinforced.
3. Curb shall be insulated.
4. The standard curb / plenum / blower assembly shall withstand wind loads of up to 125 mph without additional structural support.

G. Fan Motor and Drive:

1. Motors shall be premium efficiency, standard NEMA frame, 1800 or 3600 RPM, TEFC with a 1.15 service factor. A factory-mounted NEMA 4X disconnect switch shall be provided for each fan.

2. Motor maintenance shall be accomplished without fan impeller removal or requiring maintenance personnel to access the contaminated exhaust components. Drive arrangement shall be AMCA arrangement 9.
3. Drive belts and sheaves shall be sized for 200% of the fan operating brake horsepower, and shall be readily and easily accessible for service, if required. Drive shall consist of a minimum of two belts under all circumstances.
4. Fan shaft to be turned and polished of 316 stainless steel as standard, coated with corrosion resistant coating.
5. Fan shaft bearings shall be Air Handling Quality, ball or roller pillow block type and be sized for an L-10 life of no less than 200,000 hours. Bearings shall be fixed to the fan shaft using concentric mounting locking collars, which reduce vibration, increase service life, and improve serviceability. Bearings that use setscrews shall not be acceptable.
6. All shaft bearings and non-permanently lubricated motors shall have stainless steel braided extended lube lines with Zerk fittings.
7. Belt drive motors shall have ventilated motor cover. Motor cover shall be hinged with removable side panels for ease of maintenance to allow the servicing of the motor and drive(s).

2.5 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

2.6 SOURCE QUALITY CONTROL

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

B. AMCA Certification: Fans comply with AMCA 11 and bear the AMCA-Certified Ratings Seal.

C. Fan Sound Ratings: Comply with AMCA 311, and label fans with the AMCA-Certified Ratings Seal. Sound ratings comply with AMCA 301. The fans tested according to AMCA 300.

D. Fan Performance Ratings: Comply with AMCA 211 and label fans with AMCA-Certified Rating Seal. Fans tested for air performance - flow rate, fan pressure, power, fan efficiency, air density, speed of rotation, and fan efficiency - according to AMCA 210/ASHRAE 51.

E. Operating Limits: Classify according to AMCA 99.

F. UL Standards: Power ventilators comply with UL 705. Power ventilators for use for restaurant kitchen exhaust also comply with UL 762.

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PART 3 - EXECUTION

3.1 INSTALLATION OF HVAC POWER VENTILATORS

A. Install fans in accordance with manufacturer's Installation, Operation and Maintenance manual.

B. Install power ventilators level and plumb.

C. Secure roof-mounted fans to roof curbs with stainless steel hardware.

D. Support suspended units from structure using threaded steel rods and spring hangers having a static deflection of 1 inch.

E. Install units with clearances for service and maintenance.

F. Pipe laboratory exhaust fan housing drain to nearest roof drain.

G. Label units according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

3.2 DUCTWORK CONNECTIONS

A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 233300 "Air Duct Accessories."

3.3 ELECTRICAL CONNECTIONS

A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.

1. Nameplate: laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplate: laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.4 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring according to Section 260523 "Control-Voltage Electrical Power Cables."

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Verify that shipping, blocking, and bracing are removed.
2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
3. Verify that there is adequate maintenance and access space.
4. Verify that cleaning and adjusting are complete.
5. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
6. Adjust belt tension.
7. Adjust damper linkages for proper damper operation.
8. Verify lubrication for bearings and other moving parts.
9. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
10. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
11. Shut unit down and reconnect automatic temperature-control operators.
12. Remove and replace malfunctioning units and retest as specified above.

C. Test and adjust controls and safeties. Controls and equipment will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.6 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Adjust belt tension.

C. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing procedures.

D. Replace fan and motor pulleys as required to achieve design airflow.

E. Lubricate bearings.

3.7 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain fans.

END OF SECTION 233423

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SECTION 233600 - AIR TERMINAL UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pressure control terminal units.
2. Exhaust single-duct terminal units.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of air terminal unit.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for air terminal units.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For air terminal units.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.
4. Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation.

1.4 DELEGATED-DESIGN SUBMITTAL

1. Materials, fabrication, assembly, and spacing of hangers and supports.
2. Include design calculations, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation for selecting hangers and supports and seismic restraints.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air terminal units to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Instructions for resetting minimum and maximum air volumes.
b. Instructions for adjusting software set points.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 SINGLE-DUCT AIR TERMINAL UNITS

A. Configuration: Volume-damper assembly inside unit casing with control components inside a protective metal shroud.

B. Casing: 0.040-inch- thick galvanized steel, single wall.

1. Air Inlet: Round stub connection or S-slip and drive connections for duct attachment.
2. Air Outlet: S-slip and drive connections, size matching inlet size.
3. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket.
4. Airstream Surfaces: Surfaces in contact with the airstream comply with requirements in ASHRAE 62.1.

C. Regulator Assembly: System-air-powered bellows section incorporating polypropylene bellows for volume regulation and thermostatic control. Verify bellows operate at temperatures from zero to 140 deg F, impervious to moisture and fungus, suitable for 10-inch wg static pressure, and factory tested for leaks.

D. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.

1. Maximum Damper Leakage: AHRI 880 rated, 3percent of nominal airflow at 3-inch wg inlet static pressure.
2. Damper Position: Normally open.

E. Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with primary automatic, and secondary manual, reset thermal cutouts. Terminate elements in stainless steel, machine-staked terminals secured with stainless steel hardware.

1. Stage(s): 3.
2. SCR controlled.
3. Access door interlocked disconnect switch.
4. Downstream air temperature sensor with local connection to override discharge-air temperature to not exceed a maximum temperature set point (adjustable).
5. Nickel chrome 80/20 heating elements.
6. Airflow switch for proof of airflow.
7. Fan interlock contacts.
8. Fuses in terminal box for overcurrent protection (for coils more than 48 A).
9. Mercury contactors.
10. Pneumatic-electric switches and relays.
11. Magnetic contactor for each step of control (for three-phase coils).

F. Control devices:

1. Electronic Damper Actuator: 24 V, powered open, spring return.
2. Electronic Thermostat: Wall-mounted electronic type with temperature set-point display in Fahrenheit and Celsius.
3. Electronic Velocity Controller: Factory calibrated and field adjustable to minimum and maximum air volumes; maintain constant airflow dictated by thermostat within 5 percent of set point while compensating for inlet static-pressure variations up to 4-inch wg; and have a multipoint velocity sensor at air inlet.
4. Terminal Unit Controller: Pressure-independent, variable-air-volume (VAV) controller with electronic airflow transducer with multipoint velocity sensor at air inlet, factory calibrated to minimum and maximum air volumes, and having the following features:

    a. Occupied and unoccupied operating mode.
    b. Remote reset of airflow or temperature set points.
    c. Adjusting and monitoring with portable terminal.

5. Room Sensor: Wall mounted with temperature set-point adjustment and access for connection of portable operator terminal.

G. Controls:

1. Suitable for operation with duct pressures between 0.25- and 3.0-inch wg inlet static pressure.
2. System-powered, wall-mounted thermostat.

H. Control Sequences:

1. Occupied:

    a. In a call for cooling, airflow will increase as the damper opens towards maximum setting to satisfy set point.

b. In a call for less cooling, airflow will decrease as the damper closes towards minimum setting to satisfy set point.

2. Unoccupied:

a. Damper closes to minimum maximum setting.

2.3 CRITICAL ENVIRONMENT CONTROL VALVE

A. Configuration: Venturi valve assembly inside an externally insulated unit casing with control components inside a protective metal shroud.

B. Casing:

1. Galvanized steel.

C. Sensors: Multipoint, Type 316 stainless steel.

D. Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with primary automatic, and secondary manual, reset thermal cutouts. Terminate elements in stainless steel, machine-staked terminals secured with stainless steel hardware.

1. Stage(s): 3.
2. SCR controlled.
3. Access door interlocked disconnect switch.
4. Downstream air temperature sensor with local connection to override discharge-air temperature to not exceed a maximum temperature set point (adjustable).

E. Control Sequence:

1. Occupied (Primary Airflow On):

a. Operate as throttling control for cooling.
b. As cooling requirement decreases, control valve throttles toward minimum airflow.
c. As heating requirement increases, fan energizes to draw in warm plenum air and electric heat modulates under SCR control.

2. Unoccupied (Primary Airflow Off):

a. When externally initiated, begin the morning warm-up/cool-down function. Damper drives to the fully open position without regard for the preset maximum.
b. When pressure at primary inlet is zero or less, fan is de-energized.
c. As heating requirement increases, fan energizes to draw in warm plenum air and electric heat modulates under SCR control .

2.4 SOURCE QUALITY CONTROL

A. Factory Tests: Test assembled air terminal units according to AHRI 880.

1. Label each air terminal unit with plan number, nominal airflow, maximum and minimum factory-set airflows, coil type, and AHRI certification seal.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 5, "Hangers and Supports" and with Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes and for slabs more than 4 inches thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes and for slabs less than 4 inches thick.
5. Do not use powder-actuated concrete fasteners for seismic restraints.

C. Hangers Exposed to View: Threaded rod and angle or channel supports.

D. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.2 SEISMIC-RESTRAINT-DEVICE INSTALLATION

A. Install hangers and braces designed to support the air terminal units and to restrain against seismic forces required by applicable building codes. Comply with SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."

B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.

C. Install cables so they do not bend across edges of adjacent equipment or building structure.

D. Install cable restraints on air terminal units that are suspended with vibration isolators.

E. Install seismic-restraint devices using methods approved by the Office of Statewide Health Planning and Development for the State of California.

F. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.

G. Drilling for and Setting Anchors:

1. Identify position of reinforcing steel and other embedded items before drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify Engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Install heavy-duty sleeve anchors with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Set anchors to manufacturer's recommended torque, using a torque wrench.
5. Install zinc-coated steel anchors for interior applications and stainless steel anchors for applications exposed to weather.

3.3 TERMINAL UNIT INSTALLATION

A. Install air terminal units according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."

B. Install air terminal units level and plumb. Maintain sufficient clearance for normal service and maintenance.

C. Install wall-mounted thermostats.

3.4 CONNECTIONS

A. Where installing piping adjacent to air terminal unit, allow space for service and maintenance.

B. Hot-Water Piping: Comply with requirements in Section 232113 "Hydronic Piping" and Section 232116 Hydronic Piping Specialties," and connect heating coils to supply with shutoff valve, strainer, control valve, and union or flange; and to return with balancing valve and union or flange.

C. Comply with requirements in Section 233113 "Metal Ducts" for connecting ducts to air terminal units.

D. Make connections to air terminal units with flexible connectors complying with requirements in Section 233300 "Air Duct Accessories."

3.5 IDENTIFICATION

A. Label each air terminal unit with plan number, nominal airflow, and maximum and minimum factory-set airflows. Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for equipment labels and warning signs and labels.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. After installing air terminal units and after electrical circuitry has been energized, test for compliance with requirements.
2. Leak Test: After installation, fill water coils and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Air terminal unit will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.7 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Verify that inlet duct connections are as recommended by air terminal unit manufacturer to achieve proper performance.
3. Verify that controls and control enclosure are accessible.
4. Verify that control connections are complete.
5. Verify that nameplate and identification tag are visible.
6. Verify that controls respond to inputs as specified.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air terminal units.

END OF SECTION 233600

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SECTION 237416 - PACKAGED AIR-CONDITIONING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes packaged, small-capacity, rooftop air-conditioning units (RTUs) with the following components:

1. Casings.
2. Fans, drives, and motors.
3. Coils.
4. Refrigerant circuit components.
5. Air filtration.
6. Dampers.
7. Electrical power connections.
8. Controls.
9. Accessories.

B. Related Requirements:

1. Section 230513 “Common Motor Requirements for HVAC Equipment.”
2. Section 230593 "Testing, Adjusting, and Balancing for HVAC."
3. Section 233113 "Metal Ducts."
4. Section 233300 "Air Duct Accessories."
5. Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
6. Section 260526 "Grounding and Bonding for Electrical Systems."

1.3 DEFINITIONS

A. Outdoor-Air Refrigerant Coil: Refrigerant coil in the outdoor-air stream to reject heat during cooling operations and to absorb heat during heating operations. "Outdoor air" is defined as the air outside the building or taken from outdoors and not previously circulated through the system.

B. RTU: Rooftop unit. As used in this Section, this abbreviation means packaged, small-capacity, rooftop air-conditioning units. This abbreviation is used regardless of whether the unit is mounted on the roof or on a concrete base on ground.

1.4 ACTION SUBMITTALS

A. Product Data: For each RTU.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include rated capacities, dimensions, required clearances, characteristics, and furnished specialties and accessories.
3. Include unit dimensions and weight.
4. Include cabinet material, metal thickness, finishes, insulation, and accessories.
5. Fans:

    a. Include certified fan-performance curves with system operating conditions indicated.
    b. Include certified fan-sound power ratings.
    c. Include fan construction and accessories.
    d. Include motor ratings, electrical characteristics, and motor accessories.

6. Include certified coil-performance ratings with system operating conditions indicated.
7. Include filters with performance characteristics.
8. Include gas furnaces with performance characteristics.
9. Include dampers, including housings, linkages, and operators.

1.5 DELEGATED-DESIGN SUBMITTAL

A. For RTU supports indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Include design calculations for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
2. Detail mounting, securing, and flashing of roof curb to roof structure. Indicate coordinating requirements with roof membrane system.
3. Wind- and Seismic-Restraint Details: Detail fabrication and attachment of wind and seismic restraints and snubbers. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For RTUs to include in emergency, operation, and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: One set(s) of filters for each unit.
2. Gaskets: One set(s) for each access door.
3. Fan Belts: One set(s) for each belt-driven fan.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

B. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of RTUs and components.

C. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

D. ASHRAE 15 Compliance: For refrigeration system safety.

E. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

F. UL Compliance: Comply with UL 1995.

G. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design mounting and restraints for RTUs, including comprehensive engineering analysis.

1. Design RTU supports to comply with wind and seismic performance requirements.

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:

1. AAON.
2. Daikin Applied.
3. Trane.

2.3 UNIT CASINGS

A. General Fabrication Requirements for Casings: Formed and reinforced double-wall insulated panels, fabricated to allow removal for access to internal parts and components, with joints between sections sealed.

B. Double-Wall Construction:

1. Outside Casing Wall: Galvanized steel, minimum 18 gauge thick with corrosion-resistant coating, with pitched roof panels and knockouts with grommet seals for electrical and piping connections and lifting lugs.
2. Inside Casing Wall: G90-coated galvanized steel, 0.034 inch thick.
3. Floor Plate: G90 galvanized steel, minimum 18 gauge thick.

4. Casing Insulation:

    a. Materials: Injected polyurethane foam insulation.
    b. Casing Panel R-Value: Minimum 13.
    c. Insulation Thickness: 1 inch.
    d. Thermal Break: Provide continuity of insulation with no through-casing metal in casing walls, floors, or roof of unit.

C. Airstream Surfaces: Surfaces in contact with airstream comply with requirements in ASHRAE 62.1.

D. Static-Pressure Classifications:

1. For Unit Sections Upstream of Fans: Minus 2-inch wg.
2. For Unit Sections Downstream and Including Fans: 4-inch wg.

E. Panels and Doors:

1. Panels:

    a. Fabrication: Formed and reinforced with same materials and insulation thickness as casing.
    b. Fasteners: Two or more camlock type for panel lift-out operation. Arrangement allow panels to be opened against air-pressure differential.
    c. Gasket: Neoprene applied around entire perimeters of panel frames.
    d. Size: Large enough to allow inspection and maintenance of air-handling unit's internal components.

2. Access Doors:

    a. Hinges: A minimum of two ball-bearing hinges or stainless steel piano hinge and two wedge-lever-type latches, operable from inside and outside. Arrange doors to be opened against air-pressure differential.
    b. Gasket: Neoprene applied around entire perimeters of panel frames.
    c. Size: Large enough to allow inspection and maintenance of air-handling unit's internal components.

3. Locations and Applications:

    a. Fan Section: Doors.
    b. Access Section: Doors.
    c. Coil Section: Inspection and access panels.
    d. Damper Section: Inspection and access panels.
    e. Filter Section: Doors large enough to allow periodic removal and installation of filters.
    f. Mixing Section: Doors.

F. Condensate Drain Pans:

1. Location: Each type of cooling coil.
2. Construction:

a. Single wall, stainless steel sheet.

3. Drain Connection:

a. Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on both ends of pan.
b. Minimum Connection Size: NPS 1.

4. Slope: Minimum 0.125-in./ft. slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and from humidifiers and to direct water toward drain connection.
5. Length: Extend drain pan downstream from leaving face.
6. Width: Entire width of water producing device.
7. Depth: A minimum of 2 inches deep.
8. Pan-Top Surface Coating for Galvanized-Steel Drain Pans: Asphaltic waterproofing compound.
9. Units with stacked coils have an intermediate drain pan to collect condensate from top coil.

2.4 FANS, DRIVES, AND MOTORS

A. Fan and Drive Assemblies: Statically and dynamically balanced and designed for continuous operation at maximum-rated fan speed and motor horsepower.

B. Supply-Air Fans: Centrifugal, rated according to AMCA 210; galvanized or painted steel; mounted on solid-steel shaft.

1. Shafts: With field-adjustable alignment.

a. Turned, ground, and polished hot-rolled steel with keyway.

2. Shaft Bearings:

a. Heavy-duty, self-aligning, pillow-block type with an L-50 rated life of minimum 100,000 hours according to ABMA 9.

3. Housings: Formed- and reinforced-steel panels to form curved scroll housings with shaped cutoff and spun-metal inlet bell.

a. Bracing: Steel angle or channel supports for mounting and supporting fan scroll, wheel, motor, and accessories.

4. Centrifugal Fan Wheels: Inlet flange, backplate, and shallow blades with inlet and tip curved forward in direction of airflow and mechanically fastened to flange and backplate; steel or aluminum hub swaged to backplate and fastened to shaft with setscrews.
5. Mounting: For internal vibration isolation and seismic control. Factory-mount fans with manufacturer's standard restrained vibration isolation mounting devices having a minimum static deflection of 1 inch.
6. Shaft Lubrication Lines: Extended to a location outside the casing.

7. Flexible Connector: Factory fabricated with a fabric strip minimum 3-1/2 inches wide, attached to two strips of minimum 2-3/4-inch-wide by 0.028-inch- thick, galvanized-steel sheet.

    a. Flexible Connector Fabric: Glass fabric, double coated with neoprene. Fabrics, coatings, and adhesives comply with UL 181, Class 1.

C. Drives, Direct: Factory-mounted, direct drive.

D. Drives, Belt: Factory-mounted, V-belt drive, with adjustable alignment and belt tensioning, and with 1.5 service factor based on fan motor.

1. Pulleys: Cast iron or cast steel with split, tapered bushing, dynamically balanced at the factory.
2. Belts: Oil resistant, non-sparking and nonstatic; in matched sets for multiple-belt drives.
3. Belt Guards: Comply with requirements specified by OSHA and fabricate according to SMACNA's "HVAC Duct Construction Standards"; 0.146-inch- thick, diamond-mesh wire screen, welded to steel angle frame; prime coated.

E. Condenser-Coil Fan: propeller, mounted on shaft of permanently lubricated multispeed motors.

F. Motors:

1. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
2. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
3. Enclosure Type: Totally enclosed, fan cooled.
4. Enclosure Materials: Cast iron.
5. Efficiency: Premium efficient as defined in NEMA MG 1.
6. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in electrical Sections.

2.5 COILS

A. General Requirements for Coils:

1. Comply with AHRI 410.
2. Fabricate coils section to allow for removal and replacement of coil for maintenance and to allow in-place access for service and maintenance of coil(s).
3. Coils do not act as structural component of unit.

B. Supply-Air Refrigerant Coil:

1. Tubes: Copper.
2. Fins:

    a. Material: Copper.
    b. Fin Spacing: Maximum 12 fins per inch.

3. Fin and Tube Joints: Mechanical bond.
4. Headers: Seamless-copper headers with brazed connections.
5. Frames: Stainless steel.
6. Coatings: Corrosion-resistant coating.
7. Ratings: Designed, tested, and rated according to ASHRAE 33 and AHRI 410.

    a. Working Pressure: Minimum 300 psig.

C. Outdoor-Air Refrigerant Coil:

1. Tubes: Copper.
2. Fins:

    a. Material: Aluminum.
    b. Fin Spacing: Maximum 12 fins per inch.

3. Fin and Tube Joints: Mechanical bond.
4. Headers: Seamless-copper headers with brazed connections.
5. Frames: Stainless steel.
6. Coatings: resistant coating.
7. Ratings: Designed, tested, and rated according to ASHRAE 33 and AHRI 410.

    a. Working Pressure: Minimum 300 psig.

D. Hot-Gas Reheat Refrigerant Coil:

1. Tubes: Copper.
2. Fins:

    a. Material: Aluminum.
    b. Fin Spacing: Maximum 12 fins per inch.

3. Fin and Tube Joints: Mechanical bond.
4. Headers: Seamless-copper headers with brazed connections.
5. Frames: Stainless steel.
6. Coatings: Corrosion-resistant coating.
7. Ratings: Designed, tested, and rated according to ASHRAE 33 and AHRI 410.

    a. Working Pressure: Minimum 300 psig.

8. Suction-discharge bypass valve.

E. Electric-Resistance Heating Coils: Comply with UL 1995.

1. Casing Assembly: Slip-in or Flanged type with galvanized-steel frame.
2. Open Heating Elements: Resistance wire of 80 percent nickel and 20 percent chromium supported and insulated by floating ceramic bushings recessed into casing openings, fastened to supporting brackets, and mounted in galvanized-steel frame.
3. Overtemperature Protection: Disk-type, automatically resetting, thermal-cutout, safety device; serviceable through terminal box without removing heater from coil section.

4. Secondary Protection: Load-carrying, manually resetting or manually replaceable, thermal cutouts; factory wired in series with each heater stage.
5. Control Panel: Remote mounted with disconnecting means and overcurrent protection.

    a. Magnetic contactor.
    b. Solid-state, stepless pulse controller.
    c. Toggle switches, one per step.
    d. Step controller.
    e. Time-delay relay.
    f. Pilot lights, one per step.
    g. Airflow proving switch.

2.6 REFRIGERANT CIRCUIT COMPONENTS

A. Compressor: Hermetic, variable-speed scroll, mounted on vibration isolators; with internal overcurrent and high-temperature protection, internal pressure relief, and crankcase heater.

B. Refrigeration Specialties:

1. Refrigerant: R4504B.
2. Expansion valve with replaceable thermostatic element.
3. Refrigerant filter/dryer.
4. Manual-reset high-pressure safety switch.
5. Automatic-reset low-pressure safety switch.
6. Minimum off-time relay.
7. Automatic-reset compressor motor thermal overload.
8. Brass service valves installed in compressor suction and liquid lines.
9. Low-ambient kit high-pressure sensor.
10. Hot-gas reheat solenoid valve modulating with a replaceable magnetic coil.
11. Hot-gas bypass solenoid valve with a replaceable magnetic coil.
12. Four-way reversing valve with a replaceable magnetic coil, thermostatic expansion valves with bypass check valves, and a suction line accumulator.

2.7 AIR FILTRATION

A. Panel Filters:

1. Description: Pleated factory-fabricated, self-supported, disposable air filters with holding frames.
2. Filter Unit Class: UL 900.
3. Media: Interlaced glass, synthetic or cotton fibers coated with nonflammable adhesive and antimicrobial coating.
4. Filter-Media Frame: Beverage board with perforated metal retainer, or metal grid, on outlet side.

2.8 DAMPERS

A. Outdoor- and Return-Air Dampers: Low-leakage, double-skin, airfoil-blade, galvanized-steel dampers with compressible jamb seals and extruded-vinyl blade edge seals in opposed-blade arrangement with zinc-plated steel operating rods rotating in sintered bronze or nylon bearings mounted in a single galvanized-steel frame, and with operating rods connected with a common linkage. Leakage rate not to exceed 4 cfm/sq. ft. at 1-inch wg and 8 cfm/sq. ft. at 4-inch wg.

B. Barometric relief dampers.

C. Electronic Damper Operators:

1. Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque.
2. Electronic damper position indicator has a visual scale indicating percent of travel and 2- to 10-V dc, feedback signal.
3. Operator Motors:

    a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
    b. Size to operate with sufficient reserve power to provide smooth modulating action or two-position action.
    c. Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.

4. Nonspring-Return Motors for Dampers Larger Than 25 Sq. Ft.: Size for running torque of 150 in. x lbf and breakaway torque of 300 in. x lbf.
5. Spring-Return Motors for Dampers Larger Than 25 Sq. Ft.: Size for running and breakaway torque of 150 in. x lbf.
6. Size dampers for running torque calculated as follows:

    a. Parallel-Blade Damper with Edge Seals: 7 inch-lb/sq. ft. of damper.
    b. Opposed-Blade Damper with Edge Seals: 5 inch-lb/sq. ft. of damper.
    c. Parallel-Blade Damper without Edge Seals: 4 inch-lb/sq. ft of damper.
    d. Opposed-Blade Damper without Edge Seals: 3 inch-lb/sq. ft. of damper.
    e. Dampers with 2- to 3-Inch wg of Pressure Drop or Face Velocities of 1000 to 2500 fpm: Increase running torque by 1.5.
    f. Dampers with 3- to 4-Inch wg of Pressure Drop or Face Velocities of 2500 to 3000 fpm: Increase running torque by 2.0.

7. Coupling: V-bolt and V-shaped, toothed cradle.
8. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
9. Fail-Safe Operation: Mechanical, spring-return mechanism with external, manual gear release on nonspring-return actuators.
10. Power Requirements (Two-Position Spring Return): 120 V ac.
11. Power Requirements (Modulating): Maximum 10 VA at 24 V ac or 8 W at 24 V dc.
12. Proportional Signal: 2 to 10 V dc or 4 to 20 mA, and 2- to 10-V dc position feedback signal.
13. Temperature Rating: Minus 22 to plus 122 deg F.

2.9 ELECTRICAL POWER CONNECTIONS

A. RTU has a single connection of power to unit with unit-mounted disconnect switch accessible from outside unit and control-circuit transformer with built-in overcurrent protection.

2.10 CONTROLS

A. DDC Controller:

1. Controller has volatile-memory backup.
2. Safety Control Operation:

    a. Low-Discharge Temperature: Stop fan and close outdoor-air damper if supply-air temperature is less than 40 deg F.
    b. Defrost Control for Condenser Coil: Pressure differential switch to initiate defrost sequence.

3. Scheduled Operation: Occupied and unoccupied periods on seven-day clock with a minimum of two programmable periods per day.
4. Unoccupied Period:

    a. Heating Setback: 65 deg F.
    b. Cooling Setback: System off.
    c. Override Operation: Two hours.

5. Supply Fan Operation:

    a. Occupied Periods: Run fan continuously.
    b. Unoccupied Periods: Cycle fan to maintain setback temperature.

6. Refrigerant Circuit Operation:

    a. Occupied Periods: Cycle or stage compressors, and operate hot-gas bypass to match compressor output to cooling load to maintain discharge temperature. Cycle condenser fans to maintain maximum hot-gas pressure. Operate low-ambient control kit to maintain minimum hot-gas pressure.
    b. Unoccupied Periods: Cycle compressors and condenser fans for heating to maintain setback temperature.
    c. Switch reversing valve for heating or cooling mode on air-to-air heat pump.

7. Hot-Gas Reheat-Coil Operation:

    a. Occupied Periods: Humidistat opens hot-gas valve to provide hot-gas reheat and cycles the compressor.
    b. Unoccupied Periods: Reheat not required.
8. Fixed Minimum Outdoor-Air Damper Operation (Apply to PACU-1 only):

    a. Unoccupied Periods: Close the outdoor-air damper.

2.11 ACCESSORIES

A. Electric heater with integral thermostat maintains minimum 50 deg F temperature in gas burner compartment.

B. Duplex, 115-V, ground-fault-interrupter outlet with 15-A overcurrent protection. Include transformer if required. Outlet is energized even if the unit main disconnect is open.

C. Filter differential pressure switch with sensor tubing on either side of filter. Set for final filter pressure loss.

D. Safeties:

1. Smoke detector.
2. Condensate overflow switch.
3. Phase-loss reversal protection.
4. High and low pressure control.
5. Electric coil airflow-proving switch.

E. Coil guards of painted, galvanized-steel wire.

F. Hail guards of galvanized steel, painted to match casing.

G. Concentric diffuser with white louvers and polished aluminum return grilles, insulated diffuser box with mounting flanges, and interior transition.

H. Door switches to disable heating or reset set point when open.

I. Outdoor-air intake weather hood.

J. Oil separator.

K. Service Lights and Switch: Factory installed in fan and coil sections with weatherproof cover. Factory wire lights to a single-point field connection.

2.12 MATERIALS

A. Steel:

1. ASTM A36/A36M for carbon structural steel.
2. ASTM A568/A568M for steel sheet.

B. Stainless Steel:

1. Manufacturer's standard grade for casing.
2. Manufacturer's standard type, ASTM A240/A240M for bare steel exposed to airstream or moisture.

C. Galvanized Steel: ASTM A653/A653M.

D. Aluminum: ASTM B209.

E. Corrosion-Resistant Coating: Coat with a corrosion-resistant coating capable of withstanding a 3000-hour salt-spray test according to ASTM B117.

1. Standards:

a. ASTM B117 for salt spray.
b. ASTM D2794 for minimum impact resistance of 100 in-lb.
c. ASTM B3359 for crosshatch adhesion of 5B.

2. Application: Spray.
3. Thickness: 1 mil.
4. Gloss: Minimum gloss of 60 on a 60-degree meter.

2.13 SOURCE QUALITY CONTROL

A. AHRI Compliance:

1. Comply with AHRI 210/240 for testing and rating energy efficiencies for RTUs.
2. Comply with AHRI 340/360 for testing and rating energy efficiencies for RTUs.
3. Comply with AHRI 270 for testing and rating sound performance for RTUs.
4. Comply with AHRI 1060 for testing and rating performance for air-to-air exchanger.

B. AMCA Compliance:

1. Comply with AMCA 11 and bear the AMCA-Certified Ratings Seal for air and sound performance according to AMCA 211 and AMCA 311.
2. Damper leakage tested according to AMCA 500-D.
3. Operating Limits: Classify according to AMCA 99.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of RTUs.

B. Examine roughing-in for RTUs to verify actual locations of piping and duct connections before equipment installation.

C. Examine roofs for suitable conditions where RTUs will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Arrange installation of units to provide clear access space around air-handling units for service and maintenance.

B. Do not operate fan system until filters (temporary or permanent) are in place.

3.3 PIPING CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to RTU, allow space for service and maintenance.

C. Connect piping to unit mounted on vibration isolators with flexible connectors.

D. Connect condensate drain pans using NPS 1-1/4, ASTM B88, Type M copper tubing. Extend to nearest equipment or roof drain. Construct deep trap at connection to drain pan and install cleanouts at changes in direction.

E. Refrigerant Piping: Comply with applicable requirements in Section 232300 "Refrigerant Piping." Install shutoff valve and union or flange at each supply and return connection.

3.4 DUCT CONNECTIONS

A. Comply with duct installation requirements specified in other HVAC Sections. Drawings indicate general arrangement of ducts. The following are specific connection requirements:

1. Install ducts to termination at top of roof curb.
2. Remove roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.
3. Connect supply ducts to RTUs with flexible duct connectors specified in Section 233300 "Air Duct Accessories."
4. Install return-air duct continuously through roof structure.

3.5 ELECTRICAL CONNECTIONS

A. Connect electrical wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.

D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate: laminated acrylic or melamine plastic signs as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplate: laminated acrylic or melamine plastic signs as layers of black with engraved white letters at least 1/2 inch high.
3. Locate nameplate where easily visible.

3.6 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

3.7 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Verify that shipping, blocking, and bracing are removed.
3. Inspect for visible damage to unit casing.
4. Inspect for visible damage to furnace combustion chamber.
5. Inspect for visible damage to compressor, coils, and fans.
6. Inspect internal insulation.
7. Verify that labels are clearly visible.
8. Verify that clearances have been provided for servicing.
9. Verify that controls are connected and operable.
10. Verify that filters are installed.
11. Clean condenser coil and inspect for construction debris.
12. Clean furnace flue and inspect for construction debris.
13. Connect and purge gas line.
14. Remove packing from vibration isolators.
15. Verify that proper thermal-overload protection is installed in motors, controllers, and switches.
16. Verify that unit is secure on mountings and supporting devices and that connections to piping, ducts, and electrical systems are complete.
17. Verify that manual and automatic volume control and fire and smoke dampers in connected duct systems are in fully open position.
18. Inspect operation of barometric relief dampers.
19. Verify lubrication on fan and motor bearings.
20. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.

B. Starting procedures for units include the following:

1. Adjust fan belts to proper alignment and tension.
2. Start unit according to manufacturer's written instructions.
    a. Start refrigeration system.
    b. Do not operate below recommended low-ambient temperature.
    c. Complete startup sheets and attach copy with Contractor's startup report.
3. Inspect and record performance of interlocks and protective devices; verify sequences.
4. Operate unit for an initial period as recommended or required by manufacturer.
5. Perform the following operations for both minimum and maximum firing. Adjust burner for peak efficiency:
    a. Measure gas pressure on manifold.
    b. Inspect operation of power vents.
    c. Measure combustion-air temperature at inlet to combustion chamber.

d. Measure flue-gas temperature at furnace discharge.
e. Perform flue-gas analysis. Measure and record flue-gas carbon dioxide and oxygen concentration.
f. Measure supply-air temperature and volume when burner is at maximum firing rate and when burner is off. Calculate useful heat to supply air.

6. Calibrate thermostats.
7. Adjust and inspect high-temperature limits.
8. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers.
9. Start refrigeration system and measure and record the following when ambient is a minimum of 15 deg F above return-air temperature:

    a. Coil leaving-air, dry- and wet-bulb temperatures.
    b. Coil entering-air, dry- and wet-bulb temperatures.
    c. Outdoor-air, dry-bulb temperature.
    d. Outdoor-air-coil, discharge-air, dry-bulb temperature.

10. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
11. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated rpm. Replace fan and motor pulleys as required to achieve design conditions.
12. Measure and record motor electrical values for voltage and amperage
13. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.

    a. Supply-air volume.
    b. Return-air volume.
    c. Relief-air volume.
    d. Outdoor-air intake volume.

14. Simulate maximum cooling demand and inspect the following:

    a. Compressor refrigerant suction and hot-gas pressures.
    b. Short circuiting of air through condenser coil or from condenser fans to outdoor-air intake.

15. Verify operation of remote panel including pilot-light operation and failure modes. Inspect the following:

    a. Low-temperature safety operation.
    b. Filter high-pressure differential alarm.
    c. Economizer to minimum outdoor-air changeover.
    d. Relief-air fan operation.
    e. Smoke and fire stat alarms.

16. After startup and performance testing and prior to Substantial Completion, replace existing filters with new filters.

3.8 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for air-handling system testing, adjusting, and balancing.

3.9 CLEANING

A. After completing system installation and testing, adjusting, and balancing RTUs and air-distribution systems, clean RTUs internally to remove foreign material and construction dirt and dust. Clean fan wheels, cabinets, dampers, coils, and filter housings, and install new, clean filters.

3.10 FIELD QUALITY CONTROL

A. Perform tests and inspections with the assistance of a factory-authorized service representative.

B. Tests and Inspections:

1. After installing RTUs and after electrical circuitry has been energized, test units for compliance with requirements.
2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. RTU will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.11 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain RTUs.

1. Instructor: factory trained and certified.
2. Provide not less than eight hours of training.
3. Train personnel in operation and maintenance and to obtain maximum efficiency in plant operation.
4. Provide instructional videos showing general operation and maintenance that are coordinated with operation and maintenance manuals.
5. Obtain Owner sign-off that training is complete.
6. Owner training held at Project site.
7. Video record the training sessions and provide electronic copy to Owner.

END OF SECTION 237416

Division 26

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SECTION 260010 - SUPPLEMENTAL REQUIREMENTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Supplemental requirements generally applicable to the Work specified in Division 26. This Section is also referenced by related Work specified in other Divisions.

B. Related Requirements:

1. Section 260010 “Supplemental Requirements for Electrical” for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Division 03 “Concrete” for cast in place concrete work, including concrete encasements for electrical duct banks, equipment pads.
3. Division 31 “Earthwork” for excavation and backfilling, including gravel or sand bedding for underground work.

1.3 REFERENCES

A. Abbreviations and Acronyms for Electrical Terms and Units of Measure:

1. 8P8C: An 8-position 8-contact modular jack.
2. A: Ampere, unit of electrical current.
3. AC or ac: Alternating current.
4. AFCI: Arc-fault circuit interrupter.
5. AIC: Ampere interrupting capacity.
6. AL, Al, or ALUM: Aluminum.
7. ASD: Adjustable-speed drive.
8. ATS: Automatic transfer switch.
9. AWG: American wire gauge; see ASTM B258.
10. BAS: Building automation system.
11. BIL: Basic impulse insulation level.
12. BIM: Building information modeling.
13. CAD: Computer-aided design or drafting.
14. CATV: Community antenna television.
15. CB: Circuit breaker.
16. cd: Candela, the SI fundamental unit of luminous intensity.
17. CO/ALR: Copper-aluminum, revised.

18. COPS: Critical operations power system.
19. CU or Cu: Copper.
20. CU-AL or AL-CU: Copper-aluminum.
21. dB: Decibel, a unitless logarithmic ratio of two electrical, acoustical, or optical power values.
22. dB(A-weighted) or dB(A): Decibel acoustical sound pressure level with A-weighting applied in accordance with IEC 61672-1.
23. dB(adjusted) or dBa: Decibel weighted absolute noise power with respect to 3.16 pW (minus 85 dBm).
24. dBm: Decibel absolute power with respect to 1 mW.
25. DC or dc: Direct current.
26. DCOA: Designated critical operations area.
27. DDC: Direct digital control (HVAC).
28. EGC: Equipment grounding conductor.
29. ELV: Extra-low voltage.
30. EMF: Electromotive force.
31. EMI: Electromagnetic interference.
32. EPM: Electrical preventive maintenance.
33. EPS: Emergency power supply.
34. EPSS: Emergency power supply system.
35. ESS: Energy storage system.
36. EV: Electric vehicle.
37. EVPE: Electric vehicle power export equipment.
38. EVSE: Electric vehicle supply equipment.
39. fc: Footcandle, an internationally recognized unit of illuminance equal to one lumen per square foot or 10.76 lx. The simplified conversion 1 fc = 10 lx in the Specifications is common practice and considered adequate precision for building construction activities. When there are conflicts, lux is the primary unit; footcandle is specified for convenience.
40. FLC: Full-load current.
41. ft: Foot.
42. ft-cd: Foot-candle, the antiquated U.S. Standard unit of illuminance, equal to one international candle measured at a distance of one foot, that was superseded in 1948 by the unit "footcandle" after the SI unit candela (cd) replaced the international candle; see "fc,"
43. GEC: Grounding electrode conductor.
44. GFCI: Ground-fault circuit interrupter.
45. GFPE: Ground-fault protection of equipment.
46. GND: Ground.
47. HACR: Heating, air conditioning, and refrigeration.
48. HDPE: High-density polyethylene.
49. HID: High-intensity discharge.
50. HP or hp: Horsepower.
51. HVAC: Heating, ventilating, and air conditioning.
52. Hz: Hertz.
53. IBT: Intersystem bonding termination.
54. inch: Inch. To avoid confusion, the abbreviation "in." is not used.
55. IP: Ingress protection rating (enclosures); Internet protocol (communications).
56. IR: Infrared.
57. IS: Intrinsically safe.
58. IT&R: Inspecting, testing, and repair.
59. ITE: Information technology equipment.

60. kAIC: Kiloampere interrupting capacity.
61. kcmil or MCM: One thousand circular mils.
62. kV: Kilovolt.
63. kVA: Kilovolt-ampere.
64. kVAr or kVAR: Kilovolt-ampere reactive.
65. kW: Kilowatt.
66. kWh: Kilowatt-hour.
67. LAN: Local area network.
68. lb: Pound (weight).
69. lbf: Pound (force).
70. LCD: Liquid-crystal display.
71. LCDI: Leakage-current detector-interrupter.
72. LED: Light-emitting diode.
73. Li-ion: Lithium-ion.
74. lm: Lumen, the SI derived unit of luminous flux.
75. LNG: Liquefied natural gas.
76. LP-Gas: Liquefied petroleum gas.
77. LRC: Locked-rotor current.
78. LV: Low voltage.
79. lx: Lux, the SI derived unit of illuminance equal to one lumen per square meter.
80. m: Meter.
81. MCC: Motor-control center.
82. MDC: Modular data center.
83. MG set: Motor-generator set.
84. MIDI: Musical instrument digital interface.
85. MLO: Main lugs only.
86. MV: Medium voltage.
87. MVA: Megavolt-ampere.
88. mW: Milliwatt.
89. MW: Megawatt.
90. MWh: Megawatt-hour.
91. NC: Normally closed.
92. Ni-Cd: Nickel-cadmium.
93. Ni-MH: Nickel-metal hydride.
94. NIU: Network interface unit.
95. NO: Normally open.
96. NPT: National (American) standard pipe taper.
97. OCPD: Overcurrent protective device.
98. ONT: Optical network terminal.
99. PC: Personal computer.
100. PCS: Power conversion system.
101. PCU: Power-conditioning unit.
102. PF or pf: Power factor.
103. PHEV: Plug-in hybrid electric vehicle.
104. PLC: Programmable logic controller.
105. PLFA: Power-limited fire alarm.
106. PoE: Power over Ethernet.
107. PV: Photovoltaic.
108. PVC: Polyvinyl chloride.
109. pW: Picowatt.
110. RFI: (electrical) Radio-frequency interference; (contract) Request for interpretation.

111. RMS or rms: Root-mean-square.
112. RPM or rpm: Revolutions per minute.
113. SCADA: Supervisory control and data acquisition.
114. SCR: Silicon-controlled rectifier.
115. SPD: Surge protective device.
116. sq.: Square.
117. SWD: Switching duty.
118. TCP/IP: Transmission control protocol/Internet protocol.
119. TEFC: Totally enclosed fan-cooled.
120. TR: Tamper resistant.
121. TVSS: Transient voltage surge suppressor.
122. UL: (standards) Underwriters Laboratories, Inc.; (product categories) UL, LLC.
123. UL CCN: UL Category Control Number.
124. UPS: Uninterruptible power supply.
125. USB: Universal serial bus.
126. UV: Ultraviolet.
127. V: Volt, unit of electromotive force.
128. V(ac): Volt, alternating current.
129. V(dc): Volt, direct current.
130. VA: Volt-ampere, unit of complex electrical power.
131. VAR: Volt-ampere reactive, unit of reactive electrical power.
132. VFC: Variable-frequency controller.
133. VFD: Variable-frequency drive.
134. VOM: Volt-ohm-multimeter.
135. VPN: Virtual private network.
136. VRLA: Valve regulated lead acid; also called "sealed lead acid (SLA)" or "valve regulated sealed lead acid."
137. W: Watt, unit of real electrical power.
138. Wh: Watt-hour, unit of electrical energy usage.
139. WPT: Wireless power transfer.
140. WPTE: Wireless power transfer equipment.
141. WR: Weather resistant.

B. Abbreviations and Acronyms for Electrical Raceway Types:

1. EMT: Electrical metallic tubing.
2. EMT-A: Aluminum electrical metallic tubing.
3. EMT-S: Steel electrical metallic tubing.
4. EMT-SS: Stainless steel electrical metallic tubing.
5. ENT: Electrical nonmetallic tubing.
6. EPEC: Electrical HDPE underground conduit (thin wall).
7. EPEC-A: Type A electrical HDPE underground conduit.
8. EPEC-B: Type B electrical HDPE underground conduit.
9. ERMC: Electrical rigid metal conduit.
10. ERMC-A: Aluminum electrical rigid metal conduit.
11. ERMC-S: Steel electrical rigid metal conduit.
12. ERMC-S-G: Galvanized-steel electrical rigid metal conduit.
13. ERMC-S-PVC: PVC-coated-steel electrical rigid metal conduit.
14. ERMC-SS: Stainless steel electrical rigid metal conduit.
15. FMC: Flexible metal conduit.
16. FMC-A: Aluminum flexible metal conduit.

17. FMC-S: Steel flexible metal conduit.
18. FMT: Steel flexible metallic tubing.
19. FNMC: Flexible nonmetallic conduit. See "LFNC."
20. GRS: Galvanized rigid steel conduit.
21. HDPE: HDPE underground conduit (thick wall).
22. HDPE-40: Schedule 40 HDPE underground conduit.
23. HDPE-80: Schedule 80 HDPE underground conduit.
24. IMC: Steel electrical intermediate metal conduit.
25. LFMC: Liquidtight flexible metal conduit.
26. LFMC-A: Aluminum liquidtight flexible metal conduit.
27. LFMC-S: Steel liquidtight flexible metal conduit.
28. LFMC-SS: Stainless steel liquidtight flexible metal conduit.
29. LFNC: Liquidtight flexible nonmetallic conduit.
30. LFNC-A: Layered (Type A) liquidtight flexible nonmetallic conduit.
31. LFNC-B: Integral (Type B) liquidtight flexible nonmetallic conduit.
32. LFNC-C: Corrugated (Type C) liquidtight flexible nonmetallic conduit.
33. PVC: Rigid PVC conduit.
34. PVC-40: Schedule 40 rigid PVC conduit.
35. PVC-80: Schedule 80 rigid PVC Conduit.
36. PVC-A: Type A rigid PVC concrete-encased conduit.
37. PVC-EB: Type EB rigid PVC concrete-encased underground conduit.
38. RAC: Rigid aluminum conduit..
39. RGS: Rigid galvanized steel conduit. See ERMC-S-G.
40. RMC: Rigid metal conduit. See ERMC.
41. RTRC: Reinforced thermosetting resin conduit.
42. RTRC-AG: Low-halogen, aboveground reinforced thermosetting resin conduit.
43. RTRC-AG-HW: Heavy wall, low-halogen, aboveground reinforced thermosetting resin conduit.
44. RTRC-AG-SW: Standard wall, low-halogen, aboveground reinforced thermosetting resin conduit.
45. RTRC-AG-XW: Extra heavy wall, low-halogen, aboveground reinforced thermosetting resin conduit.
46. RTRC-BG: Low-halogen, belowground reinforced thermosetting resin conduit.

C. Abbreviations and Acronyms for Electrical Single-Conductor and Multiple-Conductor Cable Types:

1. AC: Armored cable.
2. CATV: Coaxial general-purpose cable.
3. CATVP: Coaxial plenum cable.
4. CATVR: Coaxial riser cable.
5. CI: Circuit integrity cable.
6. CL2: Class 2 cable.
7. CL2P: Class 2 plenum cable.
8. CL2R: Class 2 riser cable.
9. CL2X: Class 2 cable, limited use.
10. CL3: Class 3 cable.
11. CL3P: Class 3 plenum cable.
12. CL3R: Class 3 riser cable.
13. CL3X: Class 3 cable, limited use.
14. CM: Communications general-purpose cable.

15. CMG: Communications general-purpose cable.
16. CMP: Communications plenum cable.
17. CMR: Communications riser cable.
18. CMUC: Under-carpet communications wire and cable.
19. CMX: Communications cable, limited use.
20. DG: Distributed generation cable.
21. FC: Flat cable.
22. FCC: Flat conductor cable.
23. FPL: Power-limited fire-alarm cable.
24. FPLP: Power-limited fire-alarm plenum cable.
25. FPLR: Power-limited fire-alarm riser cable.
26. IGS: Integrated gas spacer cable.
27. ITC: Instrumentation tray cable.
28. ITC-ER: Instrumentation tray cable, exposed run.
29. MC: Metal-clad cable.
30. MC-HL: Metal-clad cable, hazardous location.
31. MI: Mineral-insulated, metal-sheathed cable.
32. MTW: (machine tool wiring) Moisture-, heat-, and oil-resistant thermoplastic cable.
33. MV: Medium-voltage cable.
34. NM: Nonmetallic sheathed cable.
35. NMC: Nonmetallic sheathed cable with corrosion-resistant nonmetallic jacket.
36. NMS: Nonmetallic sheathed cable with signaling, data, and communications conductors, plus power or control conductors.
37. NPLF: Non-power-limited fire-alarm circuit cable.
38. NPLFP: Non-power-limited fire-alarm circuit cable for environmental air spaces.
39. NPLFR: Non-power-limited fire-alarm circuit riser cable.
40. NUCC: Nonmetallic underground conduit with conductors.
41. OFC: Conductive optical fiber general-purpose cable.
42. OFCG: Conductive optical fiber general-purpose cable.
43. OFCP: Conductive optical fiber plenum cable.
44. OFCR: Conductive optical fiber riser cable.
45. OFN: Nonconductive optical fiber general-purpose cable.
46. OFNG: Nonconductive optical fiber general-purpose cable.
47. OFNP: Nonconductive optical fiber plenum cable.
48. OFNR: Nonconductive optical fiber riser cable.
49. P: Marine shipboard cable.
50. PLTC: Power-limited tray cable.
51. PLTC-ER: Power-limited tray cable, exposed run.
52. PV: Photovoltaic cable.
53. RHH: (high heat) Thermoset rubber, heat-resistant cable.
54. RHW: Thermoset rubber, moisture-resistant cable.
55. SA: Silicone rubber cable.
56. SE: Service-entrance cable.
57. SER: Service-entrance cable, round.
58. SEU: Service-entrance cable, flat.
59. SIS: Thermoset cable for switchboard and switchgear wiring.
60. TBS: Thermoplastic cable with outer braid.
61. TC: Tray cable.
62. TC-ER: Tray cable, exposed run.
63. TC-ER-HL: Tray cable, exposed run, hazardous location.
64. THW: Thermoplastic, heat- and moisture-resistant cable.

65. THHN: Thermoplastic, heat-resistant cable with nylon jacket outer sheath.
66. THHW: Thermoplastic, heat- and moisture-resistant cable.
67. THWN: Thermoplastic, moisture- and heat-resistant cable with nylon jacket outer sheath.
68. TW: Thermoplastic, moisture-resistant cable.
69. UF: Underground feeder and branch-circuit cable.
70. USE: Underground service-entrance cable.
71. XHH: Cross-linked polyethylene, heat-resistant cable.
72. XHHW: Cross-linked polyethylene, heat- and moisture-resistant cable.

D. Definitions:

1. 8-Position 8-Contact (8P8C) Modular Jack: An unkeyed jack with up to eight contacts commonly used to terminate twisted-pair and multiconductor Ethernet cable. Also called a "TIA-1096 miniature 8-position series jack" (8PSJ), or an "IEC 8877 8-pole jack."

    a. Be careful when suppliers use "RJ45" generically. Obsolete RJ45 jacks used for analog telephone cables have rejection keys. 8P8C jacks used for digital telephone cables and Ethernet cables do not have rejection keys.

2. Basic Impulse Insulation Level (BIL): Reference insulation level expressed in impulse crest voltage with a standard wave not longer than 1.5 times 50 microseconds and 1.5 times 40 microseconds.
3. Cable: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "cable" is (1) a conductor with insulation, or a stranded conductor with or without insulation (single-conductor cable); or (2) a combination of conductors insulated from one another (multiple-conductor cable).
4. Communications Jack: A fixed connecting device designed for insertion of a communications cable plug.
5. Communications Outlet: One or more communications jacks, or cables and plugs, mounted in a box or ring, with a suitable protective cover.
6. Conductor: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "conductor" is (1) a wire or combination of wires not insulated from one another, suitable for carrying an electric current; (2) National Electrical Safety Code (NESC) a material, usually in the form of wire, cable, or bar, suitable for carrying an electric current; or (3) (general) a substance or body that allows a current of electricity to pass continuously along it.
7. Designated Seismic System: A system component that requires design in accordance with Ch. 13 of ASCE/SEI 7 and for which the Component Importance Factor is greater than 1.0.
8. Direct Buried: Installed underground without encasement in concrete or other protective material.
9. Enclosure: The case or housing of an apparatus, or the fence or wall(s) surrounding an installation, to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage. Types of enclosures and enclosure covers include the following:

    a. Cabinet: An enclosure that is designed for either surface mounting or flush mounting and is provided with a frame, mat, or trim in which a swinging door or doors are or can be hung.
    b. Concrete Box: A box intended for use in poured concrete.

c. Conduit Body: A means for providing access to the interior of a conduit or tubing system through one or more removable covers at a junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.
d. Conduit Box: A box having threaded openings or knockouts for conduit, EMT, or fittings.
e. Cutout Box: An enclosure designed for surface mounting that has swinging doors or covers secured directly to and telescoping with the walls of the enclosure.
f. Device Box: A box with provisions for mounting a wiring device directly to the box.
g. Extension Ring: A ring intended to extend the sides of an outlet box or device box to increase the box depth, volume, or both.
h. Floor Box: A box mounted in the floor intended for use with a floor box cover and other components to complete the floor box enclosure.
i. Floor-Mounted Enclosure: A floor box and floor box cover assembly with means to mount in the floor that is sealed against the entrance of scrub water at the floor level.
j. Floor Nozzle: An enclosure used on a wiring system, intended primarily as a housing for a receptacle, provided with a means, such as a collar, for surface-mounting on a floor, which may or may not include a stem to support it above the floor level, and is sealed against the entrance of scrub water at the floor level.
k. Junction Box: A box with a blank cover that joins different runs of raceway or cable and provides space for connection and branching of the enclosed conductors.
l. Outlet Box: A box that provides access to a wiring system having pryout openings, knockouts, threaded entries, or hubs in either the sides or the back, or both, for the entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting an outlet box cover, but without provisions for mounting a wiring device directly to the box.
m. Pedestal Floor Box Cover: A floor box cover that, when installed as intended, provides a means for typically vertical or near-vertical mounting of receptacle outlets above the floor's finished surface.
n. Pull Box: A box with a blank cover that joins different runs of raceway and provides access for pulling or replacing the enclosed cables or conductors.
o. Raised-Floor Box: A floor box intended for use in raised floors.
p. Recessed Access Floor Box: A floor box with provisions for mounting wiring devices below the floor surface.
q. Recessed Access Floor Box Cover: A floor box cover with provisions for passage of cords to recessed wiring devices mounted within a recessed floor box.
r. Ring: A sleeve, which is not necessarily round, used for positioning a recessed wiring device flush with the plaster, concrete, drywall, or other wall surface.
s. Ring Cover: A box cover, with raised center portion to accommodate a specific wall or ceiling thickness, for mounting wiring devices or luminaires flush with the surface.
t. Termination Box: An enclosure designed for installation of termination base assemblies consisting of bus bars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors, or both.

10. Emergency Systems: Those systems legally required and classed as emergency by municipal, state, federal, or other codes, or by any governmental agency having jurisdiction that are designed to ensure continuity of lighting, electrical power, or both, to

designated areas and equipment in the event of failure of the normal supply for safety to human life.

11. Fault Limited: Providing or being served by a source of electrical power that is limited to not more than 100 W when tested in accordance with UL 62368-1.

    a. The term "fault limited" is intended to encompass most Class 1, 2, and 3 power-limited sources complying with Article 725 of NFPA 70; Class ES1 and ES2 electrical energy sources that are Class PS1 electrical power sources (e.g., USB); and Class ES3 electrical energy sources that are Class PS1 and PS2 electrical power sources (e.g., PoE). See UL 62368-1 for discussion of classes of electrical energy sources and classes of electrical power sources.

12. Jacket: A continuous nonmetallic outer covering for conductors or cables.
13. Luminaire: A complete lighting unit consisting of a light source such as a lamp, together with the parts designed to position the light source and connect it to the power supply. It may also include parts to protect the light source or the ballast or to distribute the light.
14. Mode: The terms "Active Mode," "Off Mode," and "Standby Mode" are used as defined in the Energy Independence and Security Act (EISA) of 2007.
15. Multi-Outlet Assembly: A type of surface, flush, or freestanding raceway designed to hold conductors, receptacles, and switches, assembled in the field or at the factory.
16. Plenum: A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system.
17. Receptacle: A fixed connecting device arranged for insertion of a power cord plug. Also called a power jack.
18. Receptacle Outlet: One or more receptacles mounted in a box with a suitable protective cover.
19. Sheath: A continuous metallic covering for conductors or cables.
20. UL Category Control Number (CCN): An alphabetic or alphanumeric code used to identify product categories covered by UL's Listing, Classification, and Recognition Services.
21. Voltage Class: For specified circuits and equipment, voltage classes are defined as follows:

    a. Control Voltage: Having electromotive force between any two conductors, or between a single conductor and ground, that is supplied from a battery or other Class 2 or Class 3 power-limited source.
    b. Line Voltage: (1) (controls) Designed to operate using the supplied low-voltage power without transformation. (2) (transmission lines, transformers, SPDs) The line-to-line voltage of the supplying power system.
    c. Extra-Low Voltage (ELV): Not having electromotive force between any two conductors, or between a single conductor and ground, exceeding 30 V(ac rms), 42 V(ac peak), or 60 V(dc).
    d. Low Voltage (LV): Having electromotive force between any two conductors, or between a single conductor and ground, that is rated above 30 V but not exceeding 1000 V.

22. Wire: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "wire" is a slender rod or filament of drawn metal. A group of small wires used as a single wire is properly called a "stranded wire." A wire or stranded wire covered with insulation is properly called an

"insulated wire" or a "single-conductor cable." Nevertheless, when the context indicates that the wire is insulated, the term "wire" will be understood to include the insulation.

1.4 INTERPRETATION OF CONTRACT DOCUMENTS

A. If during performance of work, there is a conflict, error, or discrepancy between or among Contract Documents and laws and regulations, provide the higher performance standard unless otherwise directed by Engineer.

B. Priority of Documents: Figured dimensions govern over scaled dimensions, detailed drawings govern over general drawing, larger scale drawings take precedence over smaller scale drawings, change order drawings supersede original contract drawings, and contract drawings govern shop drawings.

C. In general, Drawings do not show conduit routing. Plan and route conduits in compliance with specifications and drawing details. Coordinate installation with other trades and actual supplied equipment.

D. Ductbank routing shown on electrical site plans is diagrammatic in nature and may not include interferences that may be present. Prior to excavation, hydrovac the area of ductbank route.

1.5 COORDINATION

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions:

1. Notify Owner no fewer than seven days in advance of proposed interruption of electrical service.

B. Do not proceed with interruption of electrical service without Owner's written permission.Arrange to provide temporary electrical power with coordination with Owner. Refer to drawing construction sheet E-12 for details.

1.6 PREINSTALLATION MEETINGS

A. Schedule Preconstruction Meeting and other Preinstallation Meetings in accordance with Project Meetings Section in Division 01.

1.7 SEQUENCING

A. Conduct and submit results of preliminary power system studies before submitting Product Data and Shop Drawings for electrical equipment.

B. Coordinate installation work with other trades.

1.8 ACTION SUBMITTALS

A. Coordination Drawings for Structural Supports: Show coordination of structural supports for equipment and devices, including restraints and bracing for control of seismic and wind loads, with other systems, equipment, and structural supports in the vicinity.

B. Coordination Drawings for Ceiling Areas: Where indicated on drawings, provide reflected ceiling plan(s), supplemented by sections and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which equipment and suspension systems will be attached.
3. Size and location of access panels on ceilings.
4. Elevation, size, and route of sprinkler piping.
5. Elevation, size, and route of plumbing piping.
6. Elevation, size, and route of ductwork.
7. Elevation, size, and route of conduit.
8. Elevation and size of wall-mounted and ceiling-mounted equipment.
9. Access panels.
10. Sprinklers.
11. Air inlets and outlets.
12. Control modules.
13. Luminaires.
14. Communications devices.
15. Speakers.
16. Security devices.
17. Fire-alarm devices.
18. Indicate clear dimensions for maintenance access in front of equipment.
19. Indicate dimensions of fully-open access doors.
20. Relationships between components and adjacent structural, electrical, and mechanical elements.
21. Vertical and horizontal offsets and transitions.
22. Elevation and size of sleeves for wall, ceiling, and floor cable penetrations.
23. Elevation of ceilings and size of ceiling tiles.
24. Locations of access panels on ceilings.
25. Locations of access panels on ductwork.

C. Coordination Drawings for Large Equipment Indoor Installations:

1. Location plan, drawn to scale, showing heavy equipment. Indicate available width and height of doors or openings.
2. Floor plan for entry floor and floor where equipment is located, drawn to scale, showing heavy equipment access paths for maintenance and replacement, with the following items shown and coordinated with each other, based on input from installers of the items involved:

    a. Dimensioned concrete bases, outlines of equipment, conduit entries, and grounding equipment locations.
    b. Dimensioned working clearances and dedicated areas below and around electrical equipment where obstructions and tripping hazards are prohibited.

3. Reflected ceiling plans for entry floor and floor where equipment is located, drawn to scale, on which the following items shown and coordinated with each other, based on input from installers of the items involved:

    a. Support locations, type of support, and weight on each support. Locate structural supports for structure-supported raceways and seismic bracing.
    b. Location of lighting fixtures, sprinkler piping and sprinklers, ducts and diffusers, and other obstructions, indicating available overhead clearance.
    c. Dimensioned working clearances and dedicated areas above and around electrical equipment where foreign systems and equipment are prohibited.

D. Coordination Drawings for Large Equipment Outdoor Installations:

1. Utilities site plan, drawn to scale, showing heavy equipment or truck access paths with the following items shown and coordinated with each other, based on input from installers of the items involved:

    a. Fences and walls, dimensioned concrete bases, outlines of equipment, conduit entries, and grounding and bonding locations.
    b. Indicate clear dimensions for wall openings.
    c. Indicate depth and type of ground cover, and locations of trees, shrubbery, and other obstructions in access path.
    d. Dimensioned working clearances and dedicated areas around electrical equipment.

E. Submit Division 26 equipment and materials as specified in each Section at one time and not piecemeal. For example, all low voltage panelboards on a project are to be submitted under one submittal number. Submittals that do not comply will be returned disapproved.

F. Subject to Engineer’s approval, related items may be submitted together under one submittal. Contractor shall identify the multiple Sections included. For example, multiple Sections specify lighting fixtures. A single submittal for lighting could be acceptable.

G. Electrical Installation Drawings:

1. Drawings in general do not show conduit routing other than major conduit and ductbank routes. Submit conduit layouts for exposed, concealed, and buried conduits.
2. Submit electrical room layouts using approved shop drawing dimensions for equipment.
3. Submit layouts at an appropriate scale for clarity.
4. Include type written conduit schedules for easy cross check.
5. Installation submittal drawing must be approved before concrete pours are made that will conceal conduits.

H. Coordination Drawings for Duct Banks:

1. Show duct profiles and coordination with other utilities and underground structures.
2. Include plans and sections, drawn to scale, and show bends and locations of expansion fittings.

I. Training Plans: Submit instructional program outline for Engineer’s review and approval, where demonstration and/or training is specified.

1.9 INFORMATIONAL SUBMITTALS

A. Electrical Installation Schedule: At preconstruction meeting, and periodically thereafter as dates change, provide schedule for electrical installation Work to Owner and Engineer including, but not limited to, milestone dates for the following activities:

1. Submission of power system studies.
2. Submission of specified coordination drawings.
3. Submission of action submittals specified in Division 26.
4. Orders placed for major electrical equipment.
5. Arrival of major electrical equipment on-site.
6. Preinstallation meetings specified in Division 26.
7. Utility service outages.
8. Utility service inspection and activation.
9. Closing of walls and ceilings containing electrical Work.
10. System startup, testing, and commissioning activities for major electrical equipment.
11. System startup, testing, and commissioning activities for emergency lighting.
12. System startup, testing, and commissioning activities for automation systems (SCADA, BMS, lighting, HVAC, fire alarm, fire pump, etc.).
13. Pouring of concrete housekeeping pads for electrical equipment and testing of concrete samples.
14. Requests for special inspections.
15. Requests for inspections by authorities having jurisdiction.

B. Delegated Design Drawings: As indicated in individual Division 26 Sections.

C. Delegated Design Drawings for Structural Masonry Wall Penetrations: Where indicated on Drawings, provide reflected ceiling plan(s), supplemented by elevations, sections, and other details, drawn to scale, signed and sealed by a qualified structural professional engineer, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Location and dimensions of structural members supporting wall.
2. Location and dimensions of columns near penetrations.
3. Location and dimension of headers and lintels.
4. Doors and windows near penetrations.
5. Location and dimensions of penetrating cuts.
6. Sprinkler piping and sleeves.
7. Plumbing piping and sleeves.
8. Ductwork and sleeves.
9. Cable tray and sleeves.
10. Conduit and sleeves.
11. Firestopping assemblies for rated penetrations.
12. Structural supports for piping, ductwork, and conduit on both sides of wall.

13. The following systems and components are Designated Seismic Systems and require written special certification of seismic qualification by manufacturer:

    a. Hangers and supports specified in Section 260529 "Hangers and Supports for Electrical Systems."

b. Conduits and their mounting provisions specified in Section 260533.13 "Conduits for Electrical Systems."
c. Boxes and their mounting provisions specified in Section 260533.16 "Boxes and Covers for Electrical Systems."
d. Surface raceways and their mounting provisions specified in Section 260533.23 "Surface Raceways for Electrical Systems."
e. Equipment, accessories, and components specified in Section 262213 "Low-Voltage Distribution Transformers."
f. Equipment, accessories, and components specified in Section 262413 "Switchboards."
g. Equipment, accessories, and components specified in Section 262416 "Panelboards."
h. Cabinets, enclosures, racks, and their mounting provisions specified in Section 262716 "Electrical Cabinets and Enclosures."
i. Equipment, accessories, and components specified in Section 262816 "Enclosed Switches and Circuit Breakers."
j. Luminaires, accessories, and components specified in Section 265000 “Lighting”.

1.10 CLOSEOUT SUBMITTALS

A. Record Documents: Submit documentation to accurately show completed installation. Include modifications to Contract Documents (one line power diagrams, equipment elevations, panel schedules, elementary control diagrams, riser diagrams, plans, conduit and ductbank routing, etc.) along with additional drawings or sketches created to convey completed installation.

B. Operation and Maintenance Data:

1. Provide emergency operation, normal operation, and preventive maintenance manuals for each system, equipment, and device as specified in each Division 26 Sections.

1.11 DELEGATED DESIGN / PROFESSIONAL ENGINEERING SERVICES

A. When engineering services are specified to be provided by Contractor, retain a licensed professional engineer to perform the services. Engineer shall be licensed at the time services are performed and licensed in the state in which project is located. If the state issues discipline specific licenses, Engineer shall be licensed in the applicable discipline. Engineer shall be experienced in the type of work being performed.

B. Engineering work shall be done according to the applicable regulations for professional engineers to include signing, sealing, and dating documents.

1.12 QUALIFICATIONS

A. Comply with Quality Assurance Articles within each Division 26 Section.

B. Electrical Contractor Minimum Requirements: Regularly engaged in construction and corresponding installation within industrial and commercial sites for a minimum period of 10 years.

C. On Site Field Superintendent:

1. Minimum of 10 years of experience of industrial low voltage projects of comparable size and complexity.
2. Be present (or designated substitute with minimum experience as above) during medium voltage cable pulling and testing, during medium voltage switching activity, and during medium voltage equipment change over or start-up activities.

D. Power Quality Specialist: Recognized experts possessing active credentials from a qualified electrical testing laboratory recognized by authorities having jurisdiction, and able to present unexpired NICET Level 4 credentials with documented experience in power quality testing for installations similar in complexity to this Project.

E. Low-Voltage Electrical Testing and Inspecting Agency: Entities possessing active credentials from a qualified electrical testing laboratory recognized by authorities having jurisdiction.

1. On-site electrical testing supervisors must have documented certification and experience with testing electrical equipment in accordance with NETA testing standards.

F. Power-Limited Electrical Testing Agency: Entity possessing active credentials from a qualified electrical testing laboratory recognized by authorities having jurisdiction.

1. On-site power-limited testing supervisor must have BICSI Registered Communications Distribution Designer certification and documented training and experience with testing power-limited equipment in accordance with NETA testing standards.

1.13 MATERIALS AND EQUIPMENT

A. Provide new materials and equipment unless specifically noted otherwise.

B. NEMA enclosure types are listed on the Drawings and/or the specifications.

C. Electrical materials and equipment must be listed by Underwriter's Laboratories, Inc. (UL**)** and bear the appropriate listing or classification marking. Equipment not bearing a UL certification shall be field or factor UL certified prior to acceptance and use.

D. Provide major electrical equipment by a single manufacturer, i.e. switchgear, motor control centers, disconnect switches, transformers, panelboards, etc.

E. Variable frequency controllers, when provided as a stand-alone package with the driven equipment and therefore not included in a motor control center shall be by a single manufacturer.

1.14 EQUIPMENT SIZE, HANDLING, AND STORAGE

A. Coordinate with equipment manufacturer shipping splits to permit safe handling and passage of equipment to final installation location.

B. Comply with manufacturer's instructions for upright equipment orientation during transportation.

C. Protect equipment from mechanical injury, or exposure to moisture, chemicals, or corrosive gases. Do not store indoor rated electrical equipment outdoors.

D. Provide and energize temporary space heaters if required to control moisture during storage.

1.15 FIELD CONDITIONS

A. Service Conditions for Electrical Power Equipment: specified electrical power equipment must be suitable for operation under service conditions specified as usual service conditions in applicable NEMA PB series, IEEE C37 series, and IEEE C57 series standards.

1.16 ELECTRICAL SYSTEM TESTING AND SETTINGS

A. Test electrical systems and equipment in accordance with specified in each individual Division 26 Sections and Section 260800 “Commissioning of Electrical Systems”. This includes motors or other electrical equipment which are not specified in Division 26.

B. Set and adjust controls, timers, relays, adjustable trip units, protective devices, and other electrical components in accordance with manufacturers instructions and the approved power system study. Do not energize equipment without correctly setting adjustable components.

PART 2 - EXECUTION

2.1 SLEEVES AND FORMS FOR OPENINGS

A. Provide and place sleeves for conduits and slots for electrical work prior to concrete pour.

B. Use approved shop drawings and equipment vendor templates to determine exact locations for stub-ups and terminating concealed conduit and place before floor slab pour.

C. Seal openings, sleeves, penetration and slots in accordance with Section 260544 “Sleeves and Sleeve Seals for Electrical Raceways and Cabling.”

2.2 CUTTING AND PATCHING

A. Cut and patch in a workmanlike manner as required to install electrical work.

B. Modify concrete in accordance with Division 3 “Concrete.”

C. Do not cut joists, beams, girders, columns, or other structural members.

D. Patch surfaces to restore to original integrity (waterproof or fireproof as required) and appearance.

E. Core drill holes in concrete floors and walls as required. Prior to coring concrete, scan slab or wall using radar to locate and identify rebar and/or conduit and wiring. Locate cores to avoid cutting or drilling through rebar and/or conduits. Space conduits to not weaken structural

integrity. Notify Engineer immediately if rebar is cut or upon becoming aware of discrepancies within area of work.

2.3 DEMOLITION AND DISPOSITION OF EQUIPMENT

A. Drawings showing removal of major mechanical and electrical equipment is not intended to show all components to be demolished. Not all piping, conduits, ducts, equipment, ancillary devices, etc. are shown. Field verify existing conditions prior to bid.

B. Unless otherwise specifically noted, remove unused exposed conduit and support systems back to source and/or point of concealment including above accessible ceiling finishes. Wiring shall be removed.

C. Cut flush with slab, ceiling, or wall abandoned concealed conduit. Suitably plug conduits.

D. Repair and restore adjacent construction and finishes after demolition is complete.

E. Material and equipment indicated for removal or demolition is to become the Contractor’s property upon removal, unless noted otherwise. Removed material to be properly handled and disposed.

2.4 INSTALLATION OF ELECTRICAL WORK

A. Unless more stringent requirements are specified in the Contract Documents or manufacturers' written instructions, comply with NFPA 70 and NECA NEIS 1 for installation of Work specified in Division 26. Consult Engineer for resolution of conflicting requirements.

2.5 FIELD QUALITY CONTROL

A. Field testing, startup services, and system functional testing may be provided by the Contractor, and/or the manufacturer’s factory-authorized service representative, and/or an independent testing agency. Provide testing and/or startup service as specified in the relevant section.

B. Comply with Section 260800 “Commissioning of Electrical Systems.”

C. Submit Field Quality-Control Report as informational submittal within 14 days of each completed test or startup. Include within the report adjustments / as left settings.

2.6 FIELD QUALITY CONTROL

1. Administrant for Low-Voltage Electrical Tests and Inspections: Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.

B. Administrant for Power-Limited Electrical Tests and Inspections:

1. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.

C. Administrant for Structural Tests and Inspections:

1. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.

D. Administrant for Field Tests and Inspections of Lighting Installations:

1. Administer and perform tests and inspections with assistance of factory-authorized service representative.

2.7 CLEANING

A. Remove rubbish and debris from inside and around electrical equipment and enclosures.

B. Remove dirt, dust or concrete spatter from interior and exterior of equipment using brushes, vacuum cleaner, or clean lint-free rags. Do not use compressed air.

C. Waste Management:

D. Dispose all electrical and Control equipment as per Design Drawings.

2.8 CLOSEOUT ACTIVITIES

A. Provide demonstration and training as specified in each Division 26 Sections.

END OF SECTION 260010

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SECTION 260505 - SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Removal of existing electrical equipment, wiring, and conduit in areas to be remodeled; removal of designated construction; dismantling, cutting and alterations for completion of the Work.
2. Disposal of materials.
3. Storage of removed materials.
4. Identification of utilities.
5. Salvaged items.
6. Relocate existing equipment to accommodate construction.

B. Related Sections:

1. Section 260010 “Supplemental Requirements for Electrical” for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.

1.3 ACTION SUBMITTALS

A. Shop Drawings: Indicate demolition and removal sequence and location of salvageable items; location and construction of temporary work. Describe demolition removal procedures and schedule.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of capped utilities conduits and equipment abandoned in place.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with owner’s standards. PRE-INSTALLATION MEETINGS

B. Convene minimum one week prior to commencing work of this section.

1.6 SCHEDULING

A. Schedule work to coincide with new construction.

B. Perform noisy, malodorous, dusty, work:

1. Between hours of 8:00 A.M. and 5:00 P.M..

C. Cease operations immediately when structure appears to be in danger and notify Engineer/Engineer. Do not resume operations until directed.

1.7 COORDINATION

A. Conduct demolition to minimize interference with adjacent and occupied building areas.

B. Coordinate demolition work with Owner..

C. Coordinate and sequence demolition so as not to cause shutdown of operation of surrounding areas.

D. Equipment, building or structures scheduled for complete demolition shall be made safe from electrical shock hazard prior to demolition.

E. Shut-down Periods:

1. Arrange timing of shut-down periods of in-service panels with Owner. Do not shut down any utility without prior written approval.
2. Keep shut-down period to minimum or use intermittent period as directed by Owner.
3. Maintain life-safety systems in full operation in occupied facilities or provide notice minimum 3 days in advance.

F. Identify salvage items in cooperation with Owner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017300 “Execution”: Verification of existing conditions before starting work.

B. Verify wiring and equipment indicated to be demolished serve only abandoned facilities.

C. Verify termination points for demolished services.

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3.2 PREPARATION

A. Erect, and maintain temporary safeguards, including warning signs and lights, barricades, and similar measures, for protection of the public, Owner, Contractor's employees, and existing improvements to remain.

B. Temporary egress signage and emergency lighting

3.3 REMOVAL AND DISPOSAL OF LEGALLY REGULATED MATERIALS

A. Material and equipment indicated to be removed and disposed of will become the Contractor's property. Dispose of material and equipment offsite, unless otherwise directed by the Owner. Provide the Owner with a receipt indicating the acceptable disposal of any legally regulated materials or equipment.

B. Assume that the ballasts in each existing lighting fixture contain PCBs, unless specifically marked with a label indicating "No PCBs." Remove ballasts from each lighting fixture and pack them in accordance with EPA PCB regulations. Ship ballasts in approved containers to an EPA approved recycling facility; pay all shipping, packaging and recycling costs.

C. Remove, package, ship and dispose of PCBs, mercury and PCB/mercury contaminated equipment, in accordance with all State and Federal regulations. Retain the services of a firm licensed and regularly engaged in the removal of PCBs and PCB contaminated equipment. Retain a firm licensed in the State or States in which the contaminated material is handled, shipped and disposed of. Pay all fees associated with the removal of the contaminated material and equipment. Submit documentation indicating acceptable disposal.

D. If PCBs or mercury contaminated equipment are discovered that were not identified; cease work on or about the equipment and notify the Engineer immediately.

E. Remove the following electrical equipment to a location on the site for storage as directed by the Owner:

3.4 DEMOLITION

A. Demolition Drawings are based on casual field observation and existing record documents. Report discrepancies to Owner before disturbing existing installation.

B. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

C. Remove conduit, wire, boxes, and fastening devices to avoid any interference with new installation.

D. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.

E. Reconnect equipment being disturbed by renovation work and required for continue service to Temporary MCC or nearest available panel.

F. Disconnect or shut off service to areas where electrical work is to be removed. Remove electrical fixtures, equipment, and related switches, outlets, conduit and wiring which are not part of final project.

G. Install temporary wiring and connections to maintain existing systems in service during construction.

H. Perform work on energized equipment or circuits with experienced and trained personnel.

I. Remove, relocate, and extend existing installations to accommodate new construction.

J. Repair adjacent construction and finishes damaged during demolition and extension work.

K. Remove exposed abandoned grounding and bonding components, fasteners and supports, and electrical identification components, ,including abandoned components above accessible ceiling finishes. Cut embedded support elements flush with walls and floors.

L. Clean and repair existing equipment to remain or to be reinstalled.

M. Protect and retain power to existing active equipment remaining.

N. Cap abandoned empty conduit at both ends.

3.5 EXISTING PANELBOARDS

A. Ring out circuits in existing panel affected by the Work. Where additional circuits are needed, reuse circuits available for reuse. Install new breakers.

B. Tag unused circuits as spare.

C. Where existing circuits are indicated to be reused, use sensing measuring devices to verify circuits feeding Project area or are not in use.

D. Remove existing wire no longer in use from panel to equipment.

E. Provide new updated directories where more than three circuits have been modified or rewired.

3.6 SALVAGE ITEMS

A. Remove and protect items indicated on Drawings in Schedule to be salvaged and turn over to Owner.

B. Items of salvageable value may be removed as work progresses. Transport salvaged items from site as they are removed.

3.7 REUSABLE ELECTRICAL EQUIPMENT

A. Carefully remove equipment, materials, or fixtures which are to be reused.

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B. Disconnect, remove, or relocate existing electrical material and equipment interfering with new installation.

C. Relocate existing lighting fixtures as indicated on Drawings. Clean fixtures and re-lamp. Test fixture to see if it is in good working condition before installation at new location.

3.8 CLEANING

A. Remove demolished materials as work progresses. Legally dispose.

B. Keep the workplace neat.

3.9 PROTECTION OF FINISHED WORK

A. Do not permit traffic over unprotected floor surface..

END OF SECTION 260505

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SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Copper building wire.
2. Fire-alarm wire and cable.
3. Connectors and splices.

B. Related Requirements:

1. Section 260010 “Supplemental Requirements for Electrical” for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260523 "Control-Voltage Electrical Power Cables" for control systems communications cables and Classes 1, 2, and 3 control cables.

1.3 DEFINITIONS

A. VFC: Variable-frequency controller. Used interchangeably with VFD.

B. VFD: Variable frequency drive. See VFC.

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer’s cut sheet for each type of product used on project “or equal.”

B. Product Schedule: Indicate type, use, location, and termination locations.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Manufacturers: Subject to compliance with requirements, provide products by the following: :

1. Alpha Wire; brand of Belden, Inc.
2. Okonite Company (The).
3. Southwire Company, LLC.
4. Or approved equal.

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

E. Stranding: Refer to CONDUCTOR APPLICATIONS Article in PART 3.

F. Conductor Insulation:

1. Type TC-ER: Comply with NEMA WC 70/ICEA S-95-658 and UL 1277.
2. Type THHN and Type THWN-2: Comply with UL 83.
3. Type XHHW-2: Comply with UL 44.

G. Shield:

1. Type TC-ER: Cable designed for use with VFCs, with oversized crosslinked polyethylene insulation, spiral-wrapped foil plus 85 percent coverage braided shields and insulated full-size ground wire, and sunlight- and oil-resistant outer PVC jacket.

2.2 FIRE-ALARM WIRE AND CABLE

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Allied Wire & Cable Inc.
2. Comtran Corporation.
3. Prysmian Cables and Systems; Prysmian Group North America.
4. Superior Essex Inc.; subsidiary of LS Corp.
5. Or approved equal.

B. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.

C. Signaling Line Circuits: Twisted, shielded pair, size as recommended by system manufacturer.

1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire-alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a two-hour rating.

D. Non-Power-Limited Circuits: Solid-copper conductors with 600 V rated, 75 deg C, color-coded insulation, and complying with requirements in UL 2196 for a two-hour rating.

1. Low-Voltage Circuits: No. 16 AWG, minimum, in pathway.
2. Line-Voltage Circuits: No. 12 AWG, minimum, in pathway.
3. Multiconductor Armored Cable: NFPA 70, Type MC, copper conductors, Type TFN/THHN conductor insulation, copper drain wire, copper armor with outer jacket with red identifier stripe, NTRL listed for fire-alarm and cable tray installation, plenum rated.

2.3 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. 3M Electrical Products.
2. AFC Cable Systems; Atkore International.
3. Gardner Bender.
4. Ideal Industries, Inc.
5. ILSCO.
6. Or approved equal

C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.

1. Material: Tin-plated copper.
2. Type:

a. One hole with standard barrels for No. 8 AWG to No. 4/0 AWG.
b. Two holes with long barrels for 250 kcmil and larger.
c. Locking spade for No. 10 AWG and smaller.

3. Termination: Compression for No. 8 AWG and larger.

E. Connectors:

1. Solderless pressure type (wire nuts) for No. 10 AWG and smaller.
2. Pre-filled with silicone-based sealant for exterior, wet, or corrosive locations.
3. Split bolt type for No. 8 AWG and larger splices.

F. Motor Terminations: Mechanical compression ring type, secured with bolt, nut and spring washer.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Wires and Cables: Copper; stranded, except for lighting and receptacle wiring which may be solid. Minimum size for power circuits: No. 12 AWG.

B. Nominal 480/277VAC Power Circuits: Single conductors in raceway. Type XHHW-2 for sizes up to 4/0 and Type RHW-2 for size 250 kcmil and larger.

C. Nominal 240/208/120V Power Circuits: Single conductors in raceway. Type XHHW-2 for No. 8 and larger, Type THHN/THWN-2 for No. 10 AWG and smaller.

D. Direct Burial Outdoor Lighting Circuits: Type RHW-2.

E. Grounding Conductors: Refer to Section 260526 “Grounding and Bonding for Electrical Systems.”

F. and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

G. VFD Output Circuits: Type TC-ER with shield.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points in accordance with Section 260533.13 “Conduits for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Use of steel fish tapes and/or steel pulling cables in PVC conduit or raceways that terminate into energized enclosures is prohibited.

F. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.

G. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.3 INSTALLATION OF FIRE-ALARM WIRING

A. Comply with NECA 1 and NFPA 72.

B. Wiring Method: Install wiring in metal pathway according to Section 260529 "Hangers and Supports for Communications Systems."

1. Install plenum cable in environmental airspaces, including plenum ceilings.
2. Install fire-alarm circuits and equipment control wiring associated with fire-alarm system in a dedicated pathway system. Do not use this system for any other wire or cable.

C. Wiring Method:

1. Cables and pathways used for fire-alarm circuits, and equipment control wiring associated with fire-alarm system, may not contain any other wire or cable.
2. Fire-Rated Cables: Use of two-hour, fire-rated fire-alarm cables, NFPA 70, Types MI and CI, is permitted.
3. Signaling Line Circuits: Do not install power-limited fire-alarm cables in the same cable or pathway as signaling line circuits.

D. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with fire-alarm system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

E. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes; cabinets; or equipment enclosures where circuit connections are made.

F. Color-Coding: Color-code fire-alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire-alarm system junction boxes and covers red.

G. Risers: Install at least two vertical cable risers to serve the fire-alarm system. Separate risers in close proximity to each other with a minimum one-hour-rated wall, so the loss of one riser does not prevent receipt or transmission of signals from other floors or zones.

H. Wiring to Remote Alarm Transmitting Device: 1 inch conduit between the fire-alarm control panel and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors. Do not splice service or feeder cables without prior written approval of Engineer.

C. Wiring at Outlets:

1. Install conductor at each outlet, with at least 6 inch of slack.
2. Form solid wire into loop to fit around device terminal screw. Do not overlap wire.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.7 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

3.8 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance, and feeder conductors, and 480V power circuit conductors for compliance with requirements.
2. Perform each of the following visual and electrical tests:

    a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
    b. Test bolted connections for high resistance using one of the following:

        1) A low-resistance ohmmeter.
        2) Calibrated torque wrench.
        3) Thermographic survey.

    c. Inspect compression-applied connectors for correct cable match and indentation.
    d. Inspect for correct identification.
    e. Inspect cable jacket and condition.
    f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 1000 V(dc) for 600 V rated cable for a one-minute duration. Minimum wire insulation resistance: 100 Megohms.
    g. Continuity test on each conductor and cable.
    h. Uniform resistance of parallel conductors.

B. Cables will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

END OF SECTION 260519

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SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Grounding and bonding conductors.
2. Grounding and bonding materials and hardware.
3. Grounding and bonding clamps.
4. Grounding and bonding bushings.
5. Grounding and bonding hubs.
6. Grounding and bonding connectors.
7. Intersystem bonding bridge grounding connector.
8. Grounding and bonding busbars.
9. Signal reference grids.
10. Grounding (earthing) electrodes.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product used on the project.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans showing dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:

1. Test wells.
2. Ground rods.
3. Ground rings.
4. Grounding arrangements and connections for separately derived systems.

B. Qualification Data: For testing agency and testing agency's field supervisor.

C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1. In addition to items specified in Section 260010 "Supplemental Requirements for Electrical," include the following:

a. Plans showing locations of grounding features described in "Field Quality Control" Article, including the following:

1) Test wells.
2) Rod electrodes.
3) Ring electrodes.
4) Grounding arrangements and connections for separately derived systems.

b. Instructions for periodic testing and inspection of grounding features at test wells ring electrodes, and grounding connections for separately derived systems based on NETA MTS.

1) Tests must determine if ground-resistance or impedance values remain within specified maximums, and instructions must recommend corrective action if values do not.
2) Include recommended testing intervals.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Certified by NETA.

PART 2 - PRODUCTS

2.1 GROUNDING AND BONDING CONDUCTORS

A. Insulated Grounding and Bonding Conductor: Copper conductor, 600V with insulation type matching the circuit phase conductors called for in Section 260519 “Low-Voltage Electrical Power Conductors and Cables,” green color.

B. ASTM - Bare Copper Grounding and Bonding Conductor:

1. Referenced Standards: Complying with one or more of the following:

a. Soft or Annealed Copper Wire: ASTM B3.
b. Concentric-Lay Stranded Copper Conductor: ASTM B8.
c. Tin-Coated Soft or Annealed Copper Wire: ASTM B33.
d. 19-Wire Combination Unilay-Stranded Copper Conductor: ASTM B787/B787M.

2.2 GROUNDING AND BONDING MATERIALS AND HARDWARE

A. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.
b. Grounding and Bonding Equipment for Communications: UL CCN KDSH; including UL 467.

B. Ground Rods: Copper clad steel, 3/4-inch by 10-feet, sectionalized as required by Drawings.

C. Grounding Conduit Hubs: Malleable iron type.

D. Water Pipe Ground Clamps: Cast bronze saddle type.

E. Exothermic-welding Kits: CADWELD process or equal.

1. Manufacturer kits to include molds and powder recommended by kit manufacturer for materials being joined and installation conditions.
2. Welds used indoors in occupied buildings or confined space to be low emission type, CADWELD EXOLON or equal.

F. Ground Rod Test Wells: As detailed on the Drawings.

G. Ground Enhancement Material (GEM): Low-resistance, non-corrosive, carbon dust-based material that improves grounding effectiveness. Contains cement, which hardens when set to provide a permanent, maintenance-free, low-resistant grounding system that never leaches or washes away. Suitable for installation in trenches or backfilling around ground rods. Resistivity of no more than 20 ohm-cm in cured state. ERICO Part No. GEM25A or equal.

H. Bus Bars: Rectangular bar of annealed copper. As detailed on the Drawings.

2.3 GROUNDING AND BONDING CLAMPS

A. Description: Clamps suitable for attachment of grounding and bonding conductors to grounding electrodes, pipes, tubing, and rebar. Grounding and bonding clamps specified in this article are also suitable for use with communications applications.

B. Source Limitations: Obtain products from single manufacturer.

C. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.
b. Grounding and Bonding Equipment for Communications: UL CCN KDSH; including UL 467.

D. UL KDER and KDSH - Hex-Fitting-Type Pipe and Rod Grounding and Bonding Clamp:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Arlington Industries, Inc.
c. Cooper B-line; brand of Eaton, Electrical Sector.
d. Crouse-Hinds; brand of Eaton, Electrical Sector.
e. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
f. Or equal.

2. General Characteristics:

a. Two pieces with stainless steel bolts.
b. Clamp Material: Tinned brass.
c. Listed for outdoor use.

E. UL KDER and KDSH - U-Bolt-Type Pipe and Rod Grounding and Bonding Clamp.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Arlington Industries, Inc.
c. Cooper B-line; brand of Eaton, Electrical Sector.
d. Crouse-Hinds; brand of Eaton, Electrical Sector.
e. ERICO; brand of nVent Electrical plc.
f. Or equal.

2. General Characteristics:

a. Clamp Material: Tinned brass.
b. Listed for outdoor use.

F. UL KDER and KDSH - Strap-Type Pipe and Rod Grounding and Bonding Clamp.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
   b. Crouse-Hinds; brand of Eaton, Electrical Sector.
   c. ERICO; brand of nVent Electrical plc.
   d. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
   e. Panduit Corp.
   f. Or equal.

2. General Characteristics:

   a. Clamp Material: Tinned copper.
   b. Listed for outdoor use.

G. UL KDER - Beam Grounding and Bonding Clamp.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. ABB, Electrification Business.
   b. Panduit Corp.
   c. Penn-Union Corp.; subsidiary of Nesco, Inc.
   d. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
   e. Or equal.

2. General Characteristics: Mechanical-type, terminal, ground wire access from four directions; with dual, tin-plated or silicon bronze bolts.

H. UL KDER - Exothermically Welded Connection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. ABB, Electrification Business.
   b. Crouse-Hinds; brand of Eaton, Electrical Sector.
   c. ERICO; brand of nVent Electrical plc.
   d. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
   e. Or equal.

2. General Characteristics: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

I. UL KDER - Raised-Floor Signal Reference Grid Clamp:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
c. Cooper B-line; brand of Eaton, Electrical Sector.
d. ERICO; brand of nVent Electrical plc.
e. Or equal.

2. General Characteristics: Mechanical-type, stamped-steel terminal with hex head screw.

2.4 GROUNDING AND BONDING BUSHINGS

A. Description: Bonding bushings connect conduit fittings, tubing fittings, threaded metal conduit, and unthreaded metal conduit to metal boxes and equipment enclosures and have one or more bonding screws intended to provide electrical continuity between bushing and enclosure. Grounding bushings have provision for connection of bonding or grounding conductor and may or may not also have bonding screws.

B. Source Limitations: Obtain products from single manufacturer.

C. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.

D. UL KDER - Bonding Bushing:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Arlington Industries, Inc.
c. Crouse-Hinds; brand of Eaton, Electrical Sector.
d. Killark; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
e. Or equal.

2. General Characteristics: Threaded bushing with insulated throat.

E. UL KDER - Grounding Bushing:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Arlington Industries, Inc.
c. Crouse-Hinds; brand of Eaton, Electrical Sector.

d. Killark; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
e. Or equal.

2. General Characteristics: Threaded bushing with insulated throat and mechanical-type wire terminal.

2.5 GROUNDING AND BONDING HUBS

A. Description: Hubs with certified grounding or bonding locknut.

B. Source Limitations: Obtain products from single manufacturer.

C. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.

D. UL KDER - Grounding and Bonding Hub:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Arlington Industries, Inc.
c. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
d. Crouse-Hinds; brand of Eaton, Electrical Sector.
e. Or equal.

2. General Characteristics: Insulated, gasketed, watertight hub with mechanical-type wire terminal.

2.6 GROUNDING AND BONDING CONNECTORS

A. Source Limitations: Obtain products from single manufacturer.

B. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

2. Listing Criteria:

    a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.
    b. Grounding and Bonding Equipment for Communications: UL CCN KDSH; including UL 467.

C. UL KDER - Pressure-Type Grounding and Bonding Busbar Cable Connector:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    c. Or equal.

2. General Characteristics: Copper or copper alloy, for compression bonding of one or more conductor directly to copper busbar. Listed for direct burial.

D. UL KDER - Lay-In Lug Mechanical-Type Grounding and Bonding Busbar Terminal:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. ILSCO.
    c. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    d. Or equal.

2. General Characteristics: Mechanical-type, copper rated for direct burial terminal with set screw.

E. UL KDER - Crimped Lug Pressure-Type Grounding and Bonding Busbar Terminal:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. ILSCO.
    c. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    d. Or equal.

2. General Characteristics: Cast silicon bronze, solderless compression-type wire terminals; with long barrel and two holes spaced on 5/8 or 1 inch centers for two-bolt connection to busbar.

F. UL KDER - Split-Bolt Service-Post Pressure-Type Grounding and Bonding Busbar Terminal:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Panduit Corp.
    b. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.

c. Or equal.

2. General Characteristics: Bolts that surround cable and bond to cable under compression when nut is tightened after assembly is screwed into busbar opening.

G. UL KDER - Crimped Pressure-Type Grounding and Bonding Cable Connector:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
c. ILSCO.
d. Or equal.

2. General Characteristics: Crimp-and-compress connectors that bond to conductor when connector is compressed around conductor.

a. Tinned copper, C and H shaped.

H. UL KDER - Split-Bolt Pressure-Type Grounding and Bonding Cable Connector:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. ERICO; brand of nVent Electrical plc.
c. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
d. Or equal.

2. General Characteristics: Bolts that surround cable and bond to cable under compression when nut is tightened.

a. Tinned copper.

I. UL KDER - Signal Reference Grid Grounding and Bonding Connector:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Cooper B-line; brand of Eaton, Electrical Sector.
c. ERICO; brand of nVent Electrical plc.
d. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
e. Or equal.

2. General Characteristics: Combination of compression wire connectors, access floor grounding clamps, bronze U-bolt grounding clamps, and copper split-bolt connectors, designed for the purpose.

2.7 INTERSYSTEM BONDING BRIDGE GROUNDING CONNECTORS

A. Description: Devices that provide means for connecting communications systems grounding and bonding conductors at service equipment or at disconnecting means for buildings or structures.

B. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment for Communications: UL CCN KDSH; including UL 467.

C. UL KDSH - One-Piece Intersystem Bonding Bridge Grounding Connector:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Galvan Industries, Inc.; Electrical Products Division, LLC.
b. Madison Electric Products; business of Southwire Company, LLC.

2. General Characteristics: Zinc-alloy one-piece construction; six terminating points; gangable.

D. UL KDSH - Two-Piece Intersystem Bonding Bridge Grounding Connector:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
b. Crouse-Hinds; brand of Eaton, Electrical Sector.
c. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
d. Or equal.

2. General Characteristics: Copper body and polycarbonate cover; four terminating points.

2.8 GROUNDING AND BONDING BUSBARS

A. Description: Miscellaneous grounding and bonding device that serves as common connection for multiple grounding and bonding conductors.

B. Source Limitations: Obtain products from single manufacturer.

C. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.

D. UL KDER - Equipment Room Grounding and Bonding Busbar:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Cooper B-line; brand of Eaton, Electrical Sector.
b. ERICO; brand of nVent Electrical plc.
c. Hoffman; brand of nVent Electrical plc.
d. ILSCO.
e. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
f. Or equal.

2. General Characteristics:

a. Bus: Rectangular bar of annealed copper.
b. Mounting Stand-Off Insulators: Lexan or PVC.

1) Comply with UL 891 for use in 600 V switchboards, impulse tested at 5000 V.

3. Options:

a. Dimensions: 1/4 by 4 inch in cross section; length as indicated on Drawings.
b. Predrilled Hole Pattern: 9/32 inch holes spaced 1-1/8 inch apart suitable for installing specified grounding and bonding connectors.
c. Mounting Hardware: Stand-off brackets that provide 4 inch clearance to access rear of bus. Brackets and bolts must be stainless steel.

E. UL KDER - Rack and Cabinet Bonding Busbar:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Cooper B-line; brand of Eaton, Electrical Sector.
b. Harger Lightning & Grounding; business of Harger, Inc.
c. Hoffman; brand of nVent Electrical plc.
d. Panduit Corp.
e. Or equal.

2. General Characteristics:

a. Bus: Rectangular bar of hard-drawn solid copper.
b. Horizontal Mounting Dimensions: Designed for mounting in 19 inch or 23 inch wide equipment racks or cabinets.
c. Vertical Mounting Dimensions: Designed for mounting in 72 inch 36 inch high equipment racks or cabinets.
d. Predrilled Hole Pattern: Accepts connectors for grounding and bonding conductor sizes 14 AWG to 2/0 AWG.
e. Mounting Hardware: Stainless steel or copper-plated, for attachment to rack.

2.9 SIGNAL REFERENCE GRIDS

A. Description: Means for providing low-impedance path to ground over a large area, approximating an equipotential plan, while simultaneously mitigating large current spikes from faults or lightning.

B. Source Limitations: Obtain products from single manufacturer.

C. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.

D. UL KDER - Mesh-Type Signal Reference Grid:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
b. Continental Industries; brand of Hubbell Utility Solutions; Hubbell Incorporated.
c. Harger Lightning & Grounding; business of Harger, Inc.

2. General Characteristics: Conductive metal wire mesh for field-fabrication of grid.

a. Wire Size: Min 8 AWG and as specified in Drawings.
b. Wire Material: Copper-clad steel.
c. Spacing: 4 inch.
d. Welded or brazed intersections.

E. UL KDER - Tape-Type Signal Reference Grid:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Continental Industries; brand of Hubbell Utility Solutions; Hubbell Incorporated.
    b. ERICO; brand of nVent Electrical plc.
    c. Harger Lightning & Grounding; business of Harger, Inc.
    d. Or equal.

2. General Characteristics: Conductive copper tape for field-fabrication of grid.

    a. Copper Tape Dimensions: 40 mil (18 ga.) thick by 1.6 inch wide.
    b. Spacing: 24 inch.
    c. Welded or brazed fittings for intersections.

2.10 GROUNDING (EARTHING) ELECTRODES

A. Description: Grounding electrodes include rod electrodes, ring electrodes, metal underground water pipes, metal building frames, concrete-encased electrodes, and pipe and plate electrodes.

B. Source Limitations: Obtain products from single manufacturer.

C. Performance Criteria:

1. Regulatory Requirements:

    a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

2. Listing Criteria:

    a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.

D. UL KDER - Rod Electrode:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. Continental Industries; brand of Hubbell Utility Solutions; Hubbell Incorporated.
    c. ERICO; brand of nVent Electrical plc.
    d. Or equal.

2. General Characteristics: Copper-clad steel; 3/4 inch by 10 ft (19 mm by 3 m).

E. UL KDER - Plate Electrode:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ALLTEC LLC.

b. Galvan Industries, Inc.; Electrical Products Division, LLC.
c. Or equal.

2. General Characteristics: 1/4 inch thick, hot-dip galvanized.

PART 3 - EXECUTION

3.1 SELECTION OF GROUNDING AND BONDING CONDUCTORS

A. Conductors: Install solid conductor for 8 AWG and smaller, and stranded conductors for 6 AWG and larger unless otherwise indicated.

B. Bonding Cable: 28 kcmil, 14 strands of 17 AWG conductor, 1/4 inch in diameter.

C. Bonding Conductor: 4 AWG or 6 AWG, stranded conductor.

D. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inch wide and 1/16 inch thick.

E. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inch wide and 1/16 inch thick.

F. Underground Grounding Conductors: Install bare tinned-copper conductor, size as indicated on Drawings.

1. Bury at least 30 inches below grade.
2. Duct-Bank Grounding Conductor: Bury 12 inches above duct bank when indicated as part of duct-bank installation.

3.2 SELECTION OF CONNECTORS

A. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.3 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Reference Standards:

1. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest

point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor and install in conduit.

2. Consult Engineer for resolution of conflicting requirements.

C. Special Techniques:

1. Grounding Electrode Conductors:

a. Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
b. Where conductors pass through floor slabs, walls, etc., install in conduit or sleeve.
c. When conductors need to be installed in conduit for mechanical protection, use non-ferrous conduit to avoid a choke effect for fault currents.

2. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.

a. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
b. Make connections with clean, bare metal at points of contact.
c. Make aluminum-to-steel connections with stainless steel separators and mechanical clamps.
d. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
e. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
f. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1) Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate adjacent parts.
2) Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3) Use exothermic-welded connectors for outdoor locations; if disconnect-type connection is required, use bolted clamp.

g. Grounding and Bonding for Piping:

1) Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use bolted clamp connector or bolt lug-type connector to pipe flange by using one of lug bolts of flange. Where dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2) Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with bolted connector.

3) Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

h. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.

i. Grounding for Steel Building Structure: Install as indicated on Drawings.

1) Locate attachment points not subject to mechanical damage, but accessible for inspection.
2) Use exothermic weld process for wire sizes 1/0 AWG and larger. When wire size is smaller than 1/0 AWG, weld a pigtail of 1/0 AWG to structural steel then mechanically connect the two wires.

3. Electrodes:

a. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1) Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2) Use exothermic welds for below-grade connections.
3) Drive rods vertically and do not allow them to be deformed or driven at an angle. Where driving is difficult or rock is encountered, use purpose-designed drilling equipment, install rod into drilled hole and backfill around rod using ground enhancement material (GEM) mixed with water to form a slurry in accordance with manufacturer’s instructions.

b. Test Wells: Install as indicated on Drawings. Ring Electrode: Install grounding conductor, electrically connected to each building structure ground rod and to each steel column or other indicated item, extending around perimeter of building, area, or item indicated.

1) Bury ring electrode not less than 24 inch from building's foundation.
2) Lay underground conductors slack, and where exposed to mechanical injury, protect by pipes or other substantial guards. If guards are iron pipe or other magnetic material, electrically connect conductors to both ends of the guard.

c. Concrete-Encased Electrode (Ufer Ground): Fabricate in accordance with NFPA 70.

4. Grounding at Service:

a. Equipment grounding conductors and grounding electrode conductors must be connected to ground bus. Install main bonding jumper between neutral and ground buses.

5. Grounding Separately Derived Systems:

    a. Transformers: Bond neutral and ground with a bonding jumper at the equipment in accordance with NEC 250.102. Connect to the grounding electrode system via the electrode grounding conductor in accordance with NEC Table 250.66 or as indicated on the Drawings.
    b. Generators and UPS: When indicated on the Drawings as a separately derived system, bond neutral and ground with a bonding jumper at the equipment in accordance with NEC 250.102. Connect to the grounding electrode system via the electrode grounding conductor in accordance with NEC Table 250.66 or a indicated on the Drawings.
    c. Generator: Install grounding electrode(s) at generator location. Electrode must be connected to equipment grounding conductor and to frame of generator.

6. Grounding Underground Distribution System Components:

    a. Comply with IEEE C2 grounding requirements.

7. Grounding and Bonding Manholes and Handholes: Install as indicated on Drawings. Bond exposed-metal parts to ground rod or grounding conductor. Grounding and Bonding of Raceways, Cable Trays, Boxes, and Enclosures:

    a. Terminate metallic conduit into pressed steel boxes using double locknuts (same metal type as conduit) and insulated grounding bushings.
    b. Terminate metallic conduit into metallic gasketed enclosures using Meyers grounding type conduit hubs.
    c. Use insulated throat grounding bushings with lay-in type lugs to terminate metallic conduits containing equipment grounding conductors into sheet steel boxes.
    d. Bond metallic electrical system components such as cable trays, supports, brackets, braces, boxes, etc. to the raceway system if they are not rigidly secured to and in contact with the raceway system or are subject to vibration and loosening.
    e. Provide a bonding jumper across hinged metal panels or doors when electrical components in excess of 24 volts are mounted on the moveable panel.
    f. Provide a grounding bushing at the end of metallic conduits that terminate in free air.
    g. Provide 12 AWG insulated green wire bonding jumper for metal outlet boxes that contain receptacles. Connect wire from receptacle ground terminal to box using grounding screw.

8. Equipment Grounding:

    a. Install insulated equipment grounding conductors with feeders and branch circuits.
    b. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
    c. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
    d. Metallic Fences: Comply with requirements of IEEE C2.

1) Grounding Conductor: Bare, tinned copper, not less than 6 AWG.
2) Gates: Must be bonded to grounding conductor with flexible bonding jumper.
3) Barbed Wire: Strands must be bonded to grounding conductor.

3.4 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with calibrated torque wrench in accordance with manufacturer's published instructions.
3. Test completed grounding system at each location where maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before conductors are connected.

    a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method in accordance with IEEE Std 81.
    c. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

B. Nonconforming Work:

1. Grounding system will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective components and retest.

C. Collect, assemble, and submit test and inspection reports.

1. Report measured ground resistances that exceed the following values:

    a. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 Ω (ohms).
    b. Power and Lighting Equipment or System with Capacity over 500 kVA: 5 Ω (ohms).

3.5 PROTECTION

A. After installation, protect grounding and bonding cables and equipment from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

END OF SECTION 260526

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SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Support, anchorage, and attachment components.
2. Fabricated metal equipment support assemblies.

B. Related Requirements:

1.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product used on the project.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following: channel support systems, conduit support hardware, and accessories.
2. Include rated capacities and furnished specialties and accessories.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. For fabrication and installation details for electrical hangers and support systems.

1. Hangers. Include product data for components.
2. Slotted support systems.
3. Equipment supports.
4. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

1.4 DELEGATED DESIGN SUBMITTALS

A. For hangers and supports for electrical systems.

1. Include design calculations and details of hangers.
2. Include design calculations for seismic restraints.

B. Qualifications Statement: Submit qualifications for licensed professional.

1.5 QUALITY ASSURANCE

A. Delegated Design Engineer: Licensed professional engineer experienced in design of specified Work and licensed in the jurisdiction of the project location.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified structural professional engineer to design hanger and support system.

B. Surface-Burning Characteristics for Nonmetallic Channel Systems and Accessories: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame Rating: Class 1.
2. Self-extinguishing according to ASTM D635.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Aluminum Channel:

1. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
2. Channel Material: 6063-T5 aluminum alloy.
3. Fittings and Accessories Material: 5052-H32 aluminum alloy.

B. Stainless Steel Channel:

1. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
2. Material for Channel, Fittings, and Accessories: Stainless steel, Type 316.

C. Hot-dipped Galvanized Steel Channel:

1. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
2. Material for Channel, Fittings, and Accessories: Hot-dipped galvanized steel.

D. Nonmetallic Channel:

1. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
2. Channel Material: Ultraviolet resistant FRP.
3. Fittings and Accessories Material: Stainless steel, Type 316 or compatible non-metallic.

E. Accessories: Conduit clamps, straps, hangers, rods, backplates, anchors, nuts, washers, etc. to correspond with channel material as listed in the SELECTION Article. Use of galvanized steel components is only allowed with galvanized steel channel.

F. Threaded Rod: 3/8-inch diameter, minimum.

G. Expansion Anchors: 3/8-inch minimum diameter. Equal to “Kwik Bolt”, manufactured by McCullock Industries; “Wej it” manufactured by Wej it Expansion Products; or “Kwik-Bolt II” manufactured by Hilti Fastening Systems.

PART 3 - EXECUTION

3.1 SELECTION OF CHANNEL

A. Dry, indoor, conditioned, non-process space: Hot dipped galvanized steel.

B. Outdoor, process areas, or areas indicated on Drawings as “DUST”, “DAMP”, or WET”: Aluminum and/or stainless steel, depending upon load requirements.

C. Areas indicated on Drawings as “CORROSIVE”: Nonmetallic.

3.2 INSTALLATION

A. Comply with the following standards as applicable for selection and installation of hangers and supports, except where requirements on Drawings or in this Section are stricter:

1. NECA NEIS 101: Standard for Installing Steel Conduits.
2. NECA NEIS 102: Standard for Installing Aluminum Rigid Metal Conduits.
3. NECA NEIS 105: Standard for Installing Metal Cable Tray Systems.
4. NECA NEIS 111: Standard for Installing Nonmetallic Raceways.

B. Provide vibration and seismic controls with hangers and supports in accordance with requirements specified in "Section 260548 "Vibration and Seismic Controls for Electrical Systems."

C. Attach support systems only to structural components. Use concrete expansion anchors for attachment to concrete surfaces.

D. Provide a minimum of 1/2-inch clearance between wall and equipment when installing surface mounted panel boxes, junction boxes, conduit, etc.

E. Space conduit supports, other than for underground raceways, at no more than 8-foot intervals, and as required to obtain rigid construction.

F. Remove burrs and grind smooth sharp edges from channel support ends. Fit ends with plastic end caps.

3.3 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000 psi, 28-day compressive-strength concrete.

C. Anchor equipment to concrete base as follows:

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.4 PAINTING

A. Touchup:

1. Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

    a. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

2. Comply with requirements in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.

END OF SECTION 260529

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SECTION 260533.13 - CONDUITS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Conduits and fittings.

B. Products Installed, but Not Furnished, under This Section:

1. Section 260553 "Identification for Electrical Systems" for conduit identification labels.

C. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260010 “Supplemental Requirements for Electrical” for additional abbreviations, definitions, submittals, qualifications, test agencies, and other Project requirements applicable to Work specified in this Section.
3. Section 260533.16 “Boxes and Covers for Electrical Systems” for conduit bodies, outlet and device boxes, pull boxes, and junction boxes.
4. Section 260533.23 "Surface Raceways for Electrical Systems” for wireways and auxiliary gutters.
5. Section 260529 “Hangers and Supports for Electrical Systems” for channel support systems and miscellaneous mounting components.
6. Section 260543 “Underground Ducts and Raceways for Electrical Systems” for underground construction requirements.

1.3 DEFINITIONS

A. Conduit: A structure containing one or more duct raceways.

B. Duct Raceway: A single enclosed raceway for conductors or cable.

C. Duct Bank: An arrangement of conduit providing one or more continuous duct raceways between two points.

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer's cut sheet for each type of product used on project. Note some conduit types listed may not be used on the project. Refer to the Conduit Selection Table in PART 3. Indicate in the submittal, the areas where specific materials are used. If multiple manufacturers of a given type of conduit or fittings are proposed, submit those cut sheets rather than stating "or equal."

B. Conduit Layouts: For Division 26, 27, and 28 conduits installed underground and concealed within buildings and structures. Show equipment, boxes, handholes, manholes, routing, materials, and sizing. Provide layouts at an appropriate scale for clarity. Submission of separate drawings for power, lighting and control for one area is acceptable. Provide schedule for easy cross check.

PART 2 - PRODUCTS

2.1 PERFORMANCE CRITERIA

A. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

2.2 TYPE EMT DUCT RACEWAYS AND ELBOWS

A. Description: Electrical metallic tubing per NEC Article 358.

B. Listing Criteria: UL FJMX - Electrical Metallic Tubing, including UL 797.

C. Material: Hot-dipped galvanized steel (EMT-S).

2.3 TYPE ERMC-A DUCT RACEWAYS, ELBOWS, COUPLINGS, AND NIPPLES

A. Description: Rigid aluminum 6063 alloy conduit, elbows, couplings, and nipples per NEC Article 344.

B. Listing Criteria: UL DYWV - Rigid Nonferrous Metallic Conduit, including UL 6A.

C. Long radius elbows as indicated in Section 260543 "Underground Ducts and Raceways for Electrical Systems."

D. PVC Coated Type: 40 mil PVC on exterior and 2 mil urethane on interior (ERMC-A-PVC).

2.4 TYPE ERMC-S DUCT RACEWAYS, ELBOWS, COUPLINGS, AND NIPPLES

A. Description: Galvanized rigid steel conduit, elbows, couplings, and nipples, with a hot-dipped galvanized finish inside and out and per NEC Article 344.

B. Listing Criteria:

1. UL DYIX – Rigid Ferrous Metal Conduit, including UL 6.
2. UL DYJC – Rigid Ferrous Metal Conduit with Polyvinyl Chloride Coating, including UL 6.

C. Long radius elbows as indicated in Section 260543 "Underground Ducts and Raceways for Electrical Systems."

D. PVC Coated Type: 40 mil PVC on exterior and 2 mil urethane on interior. (ERMC-S-PVC).

2.5 TYPE FMC DUCT RACEWAYS

A. Description: Flexible metal conduit per NEC Article 348.

B. Listing Criteria: UL DXUZ - Flexible Metal Conduit, including UL 1.

C. Material: Hot-dipped galvanize steel (FMC-S).

2.6 TYPE FMT DUCT RACEWAYS

A. Description: Flexible metal tubing composed of hot-dipped galvanized steel strips shaped into interlocking convolutions per NEC Article 360.

B. Listing Criteria: UL ILJW - Flexible Metallic Tubing, including UL 1652.

2.7 TYPE LFMC DUCT RACEWAYS

A. Description: Liquidtight Flexible Metal Conduit, Type UA, per NEC Article 350.

B. Listing Criteria: UL DXHR – Liquid-tight Flexible Metal Conduit, including UL 360.

C. Material: Steel (LFMC-S).

D. Manufacturer: Sealtite®, Type UA, as manufactured by Anaconda, continuously interlocked flexible steel conduit with sunlight and chemical resistant PVC jacket.

2.8 TYPE LFNC-B DUCT RACEWAYS

A. Description: Liquidtight Flexible Nonmetallic Conduit, Type B, suitable for outdoor use and corrosive areas, per NEC Article 356.

B. Listing Criteria: UL DXOQ – Liquid-tight Flexible Nonmetallic Conduit, including UL 1660.

C. Manufacturer: Carflex® as manufactured by Carlon, or equal.

2.9 TYPE PVC DUCT RACEWAYS AND FITTINGS

A. Description: Rigid Polyvinyl Chloride Conduit, sunlight resistant, rated for use with 90 degree C conductors in exposed and direct or concrete encased applications, per NEC Article 352.

B. Listing Criteria: UL DZYR – Rigid Nonmetallic PVC Conduit, including UL 651.

C. Type: Schedule 40 and Schedule 80.

2.10 FITTINGS FOR CONDUIT AND TUBING

A. General: Listed and labeled for type of conduit, location, and use.

1. ERMC-A: Use cast aluminum fittings.
2. ERMC-S: Use cast malleable iron fittings.

B. Listing Criteria as Applicable:

1. UL 514B – Conduit, Tubing, and Cable Fittings.
2. UL DWTT – Conduit Fittings.
3. UL FKAV – Electrical Metallic Tubing Fittings.
4. UL ILNR – Flexible Metallic Tubing Fittings.
5. UL DXAS – Liquid-tight Flexible Metal Conduit Assemblies.

C. Refer to Section 260533.16 “Boxes and Covers for Electrical Systems” for conduit bodies such as LB’s, T’s, and C’s.

D. Metal Fittings:

1. EMT Fittings: Die cast, rain and concrete tight, compression type. Set screw type not permitted.
2. RMC Fittings: Threaded type. Threadless fittings and split couplings are not permitted.
3. FMC Fittings: Malleable iron, zinc plated, insulated throat.
4. Fittings for PVC Coated Conduit: Minimum 40 mil thick PVC coating, with overlapping sleeves of one pipe diameter in length to protect threaded joints.
5. LFMC Fittings: Three-piece screw in type, malleable iron.
6. Expansion Fittings: Include flexible external bonding jumper.
7. FMT Bushings: Insulated.
8. Grounding and Bonding Hubs, Bushings, and Hardware:

    a. Grounding Hub: Meyers type.
    b. Locknuts: Cast steel or aluminum.
    c. Bushings: Insulated throat with lay-in type lugs.

E. Nonmetallic Fittings:

1. PVC Fittings: Comply with NEMA TC 3 and match conduit material.
2. LFNC Fittings: Dust-tight, liquid-tight, chemical resistant thermoplastic/nylon construction with tapered thread hub and neoprene O-ring gasket. Push-on fittings are prohibited.

2.11 ELECTRICALLY CONDUCTIVE CORROSION-RESISTANT COMPOUNDS FOR THREADED CONDUIT.

A. Description: Cold galvanizing compound, 95 percent zinc rich paint.

B. Listing Criteria: UL CCN FOIZ; including UL Subject 2419.

2.12 SOLVENT CEMENTS

A. Description: Solvent cement to join Type PVC duct raceways and fittings.

B. Listing Criteria: UL CCN DWTT; including UL 514B.

PART 3 - EXECUTION

3.1 SELECTION OF CONDUITS FOR ELECTRICAL SYSTEMS

A. Refer to Appendix Table 260533.13-1 for conduit application requirements.

B. Minimum Raceway Size: 3/4-inch trade size.

3.2 INSTALLATION OF CONDUITS FOR ELECTRICAL SYSTEMS

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation: Unless more stringent installation requirements are specified in Contract Documents or manufacturers' published instructions, comply with the following as applicable:

1. Relevant Article of NFPA 70.
2. NECA NEIS 101 – Standard for Installing Steel Conduits.
3. NECA NEIS 102 – Standard for Installing Aluminum Rigid Metal Conduit.
4. NECA NEIS 111 – Standard for Installing Nonmetallic Raceways.
5. NEMA FB 2.10 – Selection and Installation Guidelines for Fittings for Use with Non-Flexible Metallic Conduit or Tubing.
6. NEMA FB 2.20 – Selection and Installation Guidelines for Fittings for Use with Flexible Electrical Conduit and Cable.
7. NEMA FB 2.40 – Installation Guidelines for Expansion and Expansion/Deflection Fittings.

C. Special Installation Techniques:

1. General Requirements for Installation of Duct Raceways:

a. Complete duct raceway installation before starting conductor installation.
b. Underground Installations: Refer to additional requirements in Section 260543 “Underground Ducts and Raceways for Electrical Systems”.

c. Provide stub-ups through floors with coupling threaded inside for plugs, set flush with finished floor. Plug coupling until conduit is extended above floor to final destination or a minimum of 2 feet above finished floor.
d. Coordinate stub-up locations with approved shop drawings for equipment to position stub-up directly below appropriate section of motor control center, switchboard, or switchgear.
e. Provide a 4-inch-thick concrete housekeeping pad at slab and grade penetrations. Provide a 45-degree, 3/4 inch chamfer at exposed edges.
f. Install no more than equivalent of three 90-degree bends in conduit run. Support within 12 inches of changes in direction.
g. Maximum continuous conduit run: 300 feet. Reduce distance by 75 feet for each 90-degree elbow.
h. Make bends in duct raceway using large-radius preformed ells except for parallel bends. Field bending must be in accordance with NFPA 70 minimum radii requirements. Provide only equipment specifically designed for material and size involved.
i. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
j. Support conduit within 12 inches of enclosures to which attached.
k. Drainage: Arrange conduit system to allow liquids such as water, condensation, etc. to drain away from equipment served. If conduit drainage is not possible, plug conduits using conduit seals.
l. Moisture Control: Install devices to seal duct raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal interior of duct raceways using “Duxseal” or seal fitting at the following points:

    1) Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
    2) Where an underground service duct raceway enters a building or structure.
    3) Conduit extending from interior to exterior of building.
    4) Conduit extending into pressurized duct raceway and equipment.
    5) Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
    6) Where otherwise required by NFPA 70.

m. Do not install duct raceways or electrical items on "explosion-relief" walls or rotating equipment.
n. Do not install conduits within 2 inches of the bottom side of a metal deck roof.
o. Keep duct raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal duct raceway runs above water and steam piping.
p. Cut conduit perpendicular to the length. For conduits trade size 2 and larger, use roll cutter or a guide to make cut straight and perpendicular to the length. Ream inside of conduit to remove burrs.
q. Install pull wires in empty duct raceways. Provide polypropylene or monofilament plastic line with not less than 200 lb tensile strength. Leave at least 12 inches of slack at both ends of pull wire. Cap underground duct raceways designated as spare above grade alongside duct raceways in use. Use threaded cap.

r. Install duct raceways square to the enclosure and terminate at enclosures without hubs with locknuts on both sides of enclosure wall. Install locknuts hand tight, plus one-quarter turn more.
s. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to trade size 1-1/4 and insulated throat metal bushings on trade size 1-1/2 and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits. Install Meyers grounding type hubs when conduits terminate at NEMA 3R, 4, and 4X gasketed enclosures.

2. Do not install aluminum duct raceways or fittings in contact with concrete or earth.
3. Protect metallic finish conduit installed in contact with concrete or below grade with two coats of bitumastic paint, heat shrink tubing, or approved equivalent. Provide protection from 12 inches below bottom of concrete to not less than 6 inches above surface of concrete.
4. Rigid Metal Conduit (Type ERMC):

a. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound that maintains electrical conductivity to threads of duct raceway and fittings before making up joints. Follow compound manufacturer's published instructions.
b. The use of running threads is prohibited. Where such threads are necessary, use a three piece union.

5. PVC Coated Rigid Metal Conduit (Type ERMC-A-PVC and ERMC-S-PVC):

a. Follow manufacturer's installation instructions for clamping, cutting, threading, bending, and assembly.
b. Provide PVC-coated sealing locknut for exposed male threads transitioning into female NPT threads that do not have sealing sleeves, including transitions from PVC couplings/female adapters to PVC-coated ERMC elbows in direct-burial applications. PVC-coated sealing locknuts must not be used in place of conduit hub. PVC-coated sealing locknut must cover exposed threads on PVC-coated ERMC duct raceway.
c. Coat field-cut threads on PVC-coated duct raceway with manufacturer-approved corrosion-preventing conductive compound prior to assembly.

6. Flexible Conduit Connections (Types FMC, LFMC, and LFNC):

a. Provide a maximum of 72 inches of flexible conduit for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement, and for transformers and motors.
b. Include adequate slack to allow for thermal expansion and mechanical vibration.
c. Orient outdoor flexible connections to provide drip loop to avoid accumulation of water at equipment connection points.

7. Non-Metallic Conduit (Type PVC):

a. Do not install Type PVC conduit where ambient temperature exceeds 122 degrees F. Conductor ratings must be limited to 75 degrees C except where

installed in a trench outside buildings with concrete encasement, where 90 degrees C conductors are permitted.

b. Comply with manufacturer's published instructions for solvent welding and fittings.

8. Duct Raceways Embedded in Slabs:

   a. Comply with spacing requirements as noted on Structural Drawings.
   b. Arrange duct raceways to cross building expansion joints with expansion fittings at right angles to the joint.
   c. Arrange duct raceways to ensure that each is surrounded by minimum of 1 inch of concrete without voids.

9. Stub-ups at Slabs: Arrange stub-ups so curved portions of bends are not visible above finished slab.

10. Stub-ups to Above Recessed Ceilings:

    a. Provide EMT or ERMC for duct raceways.
    b. Provide a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

11. Duct Raceway Terminations at Locations Subject to Moisture or Vibration:

    a. Provide insulating bushings to protect conductors, including conductors smaller than 4 AWG. Install insulated throat metal grounding bushings on service conduits.

12. Duct Fittings: Use only fittings listed for use with each type of tubing or conduit and in accordance with specific fittings listed under PART 2.

13. Install fittings in accordance with NEMA FB 2.10 guidelines.

    a. ERMC-A-PVC and ERMC-S-PVC: Patch and seal joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Provide sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
    b. EMT: Provide setscrew or compression, steel fittings. Comply with NEMA FB 2.10.

14. Expansion-Joint Fittings: Install where necessary to compensate for thermal expansion and contraction and wherever conduits cross building or structure expansion joints.
15. Duct Raceways Penetrating Rooms or Walls with Acoustical Requirements: Seal duct raceway openings on both sides of rooms or walls with acoustically rated putty.
16. Identification: Install identification tags at conduits in accordance with Section 260553 “Identification for Electrical Systems.”

D. Interfaces with Other Work:

1. Coordinate installation with other trades in advance of installation.

2. Restore walls, floor, and roof to original condition such as watertight, fire rating, smooth and/or painted finish after duct raceway penetration.
3. Coordinate with Section 260529 "Hangers and Supports for Electrical Systems" for installation of conduit hangers and supports.

3.3 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

3.4 APPENDICES

A. Table 260533.13-1: Conduit Selection Guidelines

Table 260533.13-1
Conduit Selection Guidelines

Raceway Type	Location / Application
EMT	Indoor air conditioned spaces in Administration / Office buildings including electrical rooms, mechanical rooms, control rooms, toilets, and offices.
ERMC-A	Indoor and outdoor applications, except where other types are listed. Exposed, non-corrosive areas. Concealed, non-corrosive areas. Under slabs in slab on grade construction / stub-ups. When installed underground or in contact with concrete, paint with two coats of bitumastic paint or use ERMC-A-PVC.
ERMC-A-PVC	Allowed for use in lieu of painting ERMC-A with two coats of bitumastic paint.
ERMC-S	Not used on this project.
ERMC-S-PVC	Not used on this project.
FMC	Flexible connections used in conjunction with EMT.

Table 260533.13-1 Conduit Selection Guidelines	
Raceway Type	Location / Application
FMT	Flexible connections to light fixtures in conjunction with EMT.
LFMC	Flexible connections used in conjunction with ERMC types.
LFNC-B	Flexible connections used in designated corrosive areas. Limited to 2-inch trade size.
PVC-40	Concrete encased duct banks. Embedded in concrete slabs or structures. Underground elbows are to be ERMC type.
PVC-80	Direct buried. Areas designated as corrosive. Protection of grounding electrode conductors. Protection of lightning conductors. Underground elbows are to be ERMC type.

END OF SECTION 260533.13

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SECTION 260533.16 - BOXES AND COVERS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Conduit bodies.
2. Metallic outlet boxes, device boxes, rings, and covers.
3. Nonmetallic outlet boxes, device boxes, rings, and covers.
4. Junction boxes and pull boxes.
5. Cover plates for device boxes.
6. Hoods for outlet boxes.

B. Products Installed, but Not Furnished, under This Section:

1. See Section 260553 "Identification for Electrical Systems" for electrical equipment labels.

C. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product used on the project.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturers' Published Instructions:

1. Metallic outlet boxes, device boxes, rings, and covers.
2. Nonmetallic outlet boxes, device boxes, rings, and covers.
3. Junction boxes and pull boxes.
4. Cover plates for device boxes.
5. Hoods for outlet boxes.

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PART 2 - PRODUCTS

2.1 PERFORMANCE CRITERIA

A. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

B. Listing Criteria as Applicable:

1. UL 514A – Metallic Outlet Boxes.
2. UL 514B – Conduit, Tubing, and Cable Fittings.
3. UL 514C – Standard for Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers.
4. UL 514D – Cover Plates for Flush-Mounted Wiring Devices.
5. UL BGUZ – Junction and Pull Boxes.
6. UL QCIT – Metallic Outlet Boxes.
7. UL QCMZ – Nonmetallic Outlet Boxes.

2.2 CONDUIT BODIES

A. Description: Means for providing access to interior of conduit or tubing system through one or more removable covers at junction or terminal point.

B. Listed and labeled for type of conduit, location, and use. Refer to Section 260533.13 “Conduits for Electrical Systems” for conduit types and fittings used on the project.

C. Use mogul type (with rollers) for metal conduit bodies sizes 2-1/2 inch and larger by Appleton Electric.

2.3 METALLIC OUTLET BOXES, DEVICE BOXES, RINGS, AND COVERS

A. Outlet and Device Box Description: Box having pry out openings, knockouts, threaded entries, or hubs in either the sides of the back, or both, for entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting outlet box cover. Outlet boxes do not include provisions to mount devices. Device boxes include provisions to mount a device to the box.

B. Extension Ring Description: Ring intended to extend sides of outlet box or device box to increase box depth, volume, or both.

C. Pressed Steel Boxes: Hot dipped galvanized with hot-dipped galvanized tile rings. For use when recessed in walls or indoors exposed in non-process ceiling areas.

1. Lighting outlet boxes: 4-11/16 inch square, 2 1/8 inch deep, minimum.
2. Device boxes with electronics device (i.e. smart switch or receptacle, occupancy sensor, dimmer, etc.): Largest size for number of gangs required.

D. Cast Boxes: Type FD (deep) only. Type FS not permitted. Copper free aluminum. PVC coated when used with PVC coated conduits. Gasketed cover when used outdoors. Stainless steel screws for covers.

E. Pedestal Device Boxes: Cast aluminum, polished finished. Used for laboratory bench receptacles.

F. Floor Boxes: Concrete tight. Number and type of devices as indicated on Drawings.

2.4 NONMETALLIC OUTLET BOXES, DEVICE BOXES, RINGS, AND COVERS

A. Outlet and Device Box Description: Box having pry out openings, knockouts, threaded entries, or hubs in either the sides of the back, or both, for entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting outlet box cover. Outlet boxes do not include provisions to mount devices. Device boxes include provisions to mount a device to the box.

B. Only allowed in conjunction with PVC schedule 80 exposed conduit installations.

C. Type FD (deep) box only. Type FS (shallow) box not allowed.

2.5 JUNCTION BOXES AND PULL BOXES

A. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable. Boxes that contain terminals, relays, surge protective devices, or devices mounted on the cover are specified under Section 262716 “Electrical Cabinets and Enclosures”.

B. NEMA 1 and NEMA 12 Junction and Pull Boxes:

1. Material: Sheet steel, minimum 14 gauge, without knockouts.
2. Construction: Flanged box, galvanized with continuous weld seams that are ground smooth.
3. Cover: Gasketed, hinged, fastened with quick connect door clamp.

C. NEMA 4X Junction and Pull Boxes:

1. Material: Type 316 stainless steel, minimum 14 gauge, without knockouts.
2. Construction: Flanged box, continuous weld seams that are ground smooth.
3. Cover: Gasketed, hinged, fastened with quick connect door clamp.

2.6 COVER PLATES FOR DEVICES BOXES

A. Single Source: Obtain wall plates from same manufacturer of wiring device. Refer to Section 262726 “Wiring Devices” for requirements.

B. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Flush Mounted Devices in Indoor Administrative Spaces: Includes offices, conference rooms, break rooms, restrooms, and control rooms. Smooth, high impact thermoplastic or nylon. Color to match wiring device.
3. Material for Flush Mounted Devices in Indoor Industrial Spaces: Includes electrical rooms, mechanical rooms, janitor closets, and indoor process areas. Type 302 (18-8) high nickel stainless steel.

4. Material for Surface Mounted Devices: Match box material.

2.7 HOODS FOR OUTLET BOXES

A. Description: Hood to mount to box for to create weatherproof while in use condition.

B. Wet-Location, Weatherproof Cover Plates (Hoods) for Switches and Receptacles: NEMA 250, complying with Type 3R, in-use weather-resistance, die-cast aluminum with lockable cover.

2.8 METALLIC OUTLET BOXES, DEVICE BOXES, RINGS, AND COVERS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.
2. Listing Criteria: UL CCN QCIT; including UL 514A.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.
3. Samples:

    a. Floor Box Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors and flooring inserts for each type of floor box.
    b. Raised Floor Box Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors and flooring inserts for each type of floor box.
    c. Recessed Access-Floor Box Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors and flooring inserts for each type of floor box.
    d. Concrete Box Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors and flooring inserts for each type of floor box.

C. UL QCIT - Metallic Outlet Boxes and Covers:

1. Description: Box having pryout openings, knockouts, threaded entries, or hubs in either the sides of the back, or both, for entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting outlet box cover, but without provisions for mounting wiring device directly to box.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.

b. Appleton; Emerson Electric Co., Automation Solutions.
c. Crouse-Hinds; brand of Eaton, Electrical Sector.
d. Hubbell Premise Wiring; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
e. Topaz Lighting & Electric.
f. Or equal.

3. Options:

a. Material: Sheet aluminum.
b. Sheet Metal Depth: Minimum 2 inch.
c. Cast-Metal Depth: Minimum 2.4 inch.
d. Luminaire Outlet Boxes and Covers: Nonadjustable, listed and labeled for attachment of luminaire weighing up to 50 lb or more than 50 lb and marked with maximum allowable weight.
e. Paddle Fan Outlet Boxes and Covers: Nonadjustable, designed for attachment of paddle fan weighing up to 70 lb.

D. UL QCIT - Metallic Conduit Bodies:

1. Description: Means for providing access to interior of conduit or tubing system through one or more removable covers at junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Appleton; Emerson Electric Co., Automation Solutions.
c. Crouse-Hinds; brand of Eaton, Electrical Sector.
d. Killark; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
e. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
f. Topaz Lighting & Electric.
g. Or equal.

E. UL QCIT - Metallic Device Boxes:

1. Description: Box with provisions for mounting wiring device directly to box.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Appleton; Emerson Electric Co., Automation Solutions.
c. Arlington Industries, Inc.
d. Hubbell Premise Wiring; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
e. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.

f. Topaz Lighting & Electric.
g. Or equal.

3. Options:

a. Material: Sheet aluminum.
b. Sheet Metal Depth: minimum 2 inch.
c. Cast-Metal Depth: minimum 2.4 inch.

F. UL QCIT - Metallic Extension Rings:

1. Description: Ring intended to extend sides of outlet box or device box to increase box depth, volume, or both.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Appleton; Emerson Electric Co., Automation Solutions.
c. Cooper B-line; brand of Eaton, Electrical Sector.
d. Crouse-Hinds; brand of Eaton, Electrical Sector.
e. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
f. Or equal.

G. UL QCIT - Metallic Floor Boxes and Floor Box Covers:

1. Description: Box mounted in floor with floor box cover and other components to complete floor box enclosure.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. AFC Cable Systems; Atkore International.
c. Arlington Industries, Inc.
d. FSR Inc.
e. Hubbell Premise Wiring; brand of Hubbell Electrical Solutions; Hubbell Incorporated.

H. UL QCIT - Metallic Raised-Floor Boxes and Floor Box Covers:

1. Description: Box mounted in raised floor with floor box cover and other components to complete floor box enclosure.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.

c. Wiremold; Legrand North America, LLC.
d. Or equal.

I. UL QCIT - Metallic Recessed Access-Floor Boxes and Recessed Floor Box Covers:

1. Description: Floor box with provisions for mounting wiring devices below floor surface and floor box cover with provisions for passage of cords to recessed wiring devices mounted within floor box.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. FSR Inc.
c. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
d. Or equal.

J. UL QCIT - Metallic Concrete Boxes and Covers:

1. Description: Box intended for use in poured concrete.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Crouse-Hinds; brand of Eaton, Electrical Sector.
c. Hubbell Premise Wiring; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
d. Topaz Lighting & Electric.
e. Or equal.

2.9 NONMETALLIC OUTLET BOXES, DEVICE BOXES, RINGS, AND COVERS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. Listing Criteria: UL CCN QCMZ; including UL 514C.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

3. Samples:

    a. Floor Box Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors and flooring inserts for each type of floor box.
    b. Raised Floor Box Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors and flooring inserts for each type of floor box.
    c. Recessed Access-Floor Box Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors and flooring inserts for each type of floor box.
    d. Concrete Box Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors and flooring inserts for each type of floor box.

C. UL QCMZ - Nonmetallic Outlet Boxes and Covers:

1. Description: Box having pryout openings, knockouts, threaded entries, or hubs in either the sides or the back, or both, for entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting outlet box cover, but without provisions for mounting wiring device directly to box.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. Appleton; Emerson Electric Co., Automation Solutions.
    c. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
    d. Crouse-Hinds; brand of Eaton, Electrical Sector.
    e. Hubbell Premise Wiring; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    f. Or equal.

D. UL QCMZ - Nonmetallic Conduit Bodies:

1. Description: Means for providing access to interior of conduit or tubing system through one or more removable covers at junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. Arlington Industries, Inc.
    c. Topaz Lighting & Electric.
    d. Or equal.

E. UL QCMZ - Nonmetallic Device Boxes:

1. Description: Box with provisions for mounting wiring device directly to box.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. Arlington Industries, Inc.
    c. Crouse-Hinds; brand of Eaton, Electrical Sector.
    d. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    e. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    f. Or equal.

F. UL QCMZ - Nonmetallic Extension Rings:

1. Description: Ring intended to extend sides of outlet box or device box to increase box depth, volume, or both.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. Arlington Industries, Inc.
    c. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
    d. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    e. Or equal.

G. UL QCMZ - Nonmetallic Floor Boxes and Floor Box Covers:

1. Description: Box mounted in floor with floor box cover and other components to complete floor box enclosure.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. Arlington Industries, Inc.
    c. Cantex Inc.
    d. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    e. Or equal.

H. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. Listing Criteria: UL CCN BGUZ; including UL 50 and UL 50E.

I. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.

2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

J. UL BGUZ - Indoor Sheet Metal Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Appleton; Emerson Electric Co., Automation Solutions.
b. Cooper B-line; brand of Eaton, Electrical Sector.
c. Hoffman; brand of nVent Electrical plc.
d. Hubbell Industrial Controls; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
e. Square D; Schneider Electric USA.
f. Or equal.

3. Options:

a. Degree of Protection: As per Drawings..

K. UL BGUZ - Indoor Cast-Metal Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Adalet.
b. Appleton; Emerson Electric Co., Automation Solutions.
c. Crouse-Hinds; brand of Eaton, Electrical Sector.
d. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
e. Or equal.

3. Options:

a. Degree of Protection: As per Drawings.

L. UL BGUZ - Indoor Polymeric Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Cantex Inc.

c. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
d. Topaz Lighting & Electric.
e. Or equal.

3. Options:

a. Degree of Protection: As per Drawings.

M. UL BGUZ - Outdoor Sheet Metal Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Appleton; Emerson Electric Co., Automation Solutions.
b. Cooper B-line; brand of Eaton, Electrical Sector.
c. Hoffman; brand of nVent Electrical plc.
d. Hubbell Industrial Controls; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
e. Square D; Schneider Electric USA.
f. Or equal.

3. Options:

a. Degree of Protection As per Drawings .

N. UL BGUZ - Outdoor Cast-Metal Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Adalet.
b. Appleton; Emerson Electric Co., Automation Solutions.
c. Crouse-Hinds; brand of Eaton, Electrical Sector.
d. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
e. Or equal.

3. Options:

a. Degree of Protection: .

O. UL BGUZ - Outdoor Polymeric Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. Cantex Inc.
    c. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    d. Topaz Lighting & Electric.

3. Options:

    a. Degree of Protection: As per Drawings.

2.10 COVER PLATES FOR DEVICES BOXES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. Listing Criteria: UL CCN QCIT or UL CCN QCMZ; including UL 514D.
3. Wallplate-Securing Screws: Metal with head color to match wallplate finish.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.

2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL QCIT or QCMZ - Metallic Cover Plates for Device Boxes:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. ABB, Electrification Business.
    b. Appleton; Emerson Electric Co., Automation Solutions.
    c. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
    d. Crouse-Hinds; brand of Eaton, Electrical Sector.
    e. Hubbell Premise Wiring; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    f. Leviton Manufacturing Co., Inc.
    g. Or equal.

2. Options:

    a. Damp and Wet Locations: Listed, labeled, and marked for location and use. Provide gaskets and accessories necessary for compliance with listing.

b. Wallplate Material: 0.040 inch thick aluminum, anodized or lacquered to prevent corrosion Cast aluminum.

D. UL QCIT or QCMZ - Nonmetallic Cover Plates for Device Boxes:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Appleton; Emerson Electric Co., Automation Solutions.
c. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
d. Crouse-Hinds; brand of Eaton, Electrical Sector.
e. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
f. Leviton Manufacturing Co., Inc.
g. Or equal.

2. Options:

a. Damp and Wet Locations: Listed, labeled, and marked for location and use. Provide gaskets and accessories necessary for compliance with listing.
b. Wallplate Material: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device.
c. Color: White in accordance with NEMA WD 1 or as indicated on architectural Drawings.

E. UL QCIT or QCMZ - Illuminating Cover Plates for Device Boxes:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Leviton Manufacturing Co., Inc.
b. Or equal.

2. Options:

a. Damp and Wet Locations: Listed, labeled, and marked for location and use. Provide gaskets and accessories necessary for compliance with listing.
b. Wallplate Material: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device or as indicated on architectural Drawings.
c. Color: White in accordance with NEMA WD 1 or as indicated on architectural Drawings.

2.11 HOODS FOR OUTLET BOXES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.

2. Listing Criteria:

    a. UL CCN QCIT or UL CCN QCMZ; including UL 514D.
    b. Receptacle, Hood, Cover Plate, Gaskets, and Seals: UL 498 Supplement SA when mated with box or enclosure complying with UL 514A, UL 514C, or UL 50E.

3. Mounts to box using fasteners different from wiring device.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL QCIT or QCMZ - Retractable or Reattachable Hoods for Outlet Boxes:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    c. Or equal.

2. Options:

    a. Provides clear, weatherproof, "while-in-use" cover.

D. UL QCIT or QCMZ - Extra-Duty, While-in-Use Hoods for Outlet Boxes:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. Appleton; Emerson Electric Co., Automation Solutions.
    c. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
    d. Leviton Manufacturing Co., Inc.
    e. Or equal.

2. Additional Characteristics: Marked "Extra-Duty" in accordance with UL 514D.
3. Options:

    a. Provides clear, weatherproof, "while-in-use" cover.
    b. Manufacturer may combine nonmetallic device box with hood as extra-duty rated assembly.

PART 3 - EXECUTION

3.1 SELECTION OF BOXES AND COVERS FOR ELECTRICAL SYSTEMS

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NFPA 70 for selection of boxes and enclosures. Consult Engineer for resolution of conflicting requirements.

B. Conduit bodies: Match associated conduit type.

C. Outlet boxes recessed in walls or indoors exposed in non-process ceiling areas: Pressed steel.

D. Exposed outlet and device boxes: Cast metal except where PVC-80 is used. Use PVC coated cast metal when conduit is PVC coated. Use non-metallic when PVC-80 is used.

E. Junction and pull boxes: Suitable for the location and conform to the NEMA enclosure ratings and material descriptions included on Drawings. Where no size is indicated, size in accordance with NEC Article 314.

3.2 INSTALLATION OF BOXES AND COVERS FOR ELECTRICAL SYSTEMS

A. Comply with manufacturer's published instructions.

B. Special Installation Techniques:

1. Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures.
2. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
3. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box, whether installed indoors or outdoors.
4. Horizontally separate boxes mounted on opposite sides of walls, so they are not in the same vertical channel.
5. Locate boxes so that cover or plate will not span different building finishes.
6. Support boxes in recessed ceilings independent of ceiling tiles and ceiling grid.
7. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for purpose.
8. Fasten junction and pull boxes to, or support from, building structure. Do not support boxes by conduits.
9. Set metal floor boxes level and flush with finished floor surface.
10. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.
11. Do not install aluminum boxes, enclosures, or fittings in contact with concrete or earth.
12. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to ensure a continuous ground path.

13. Identification: Install labels and nameplates in accordance with Section 260553 “Identification for Electrical Systems.”

3.3 CLEANING

A. Remove construction dust and debris from boxes before installing wallplates, covers, and hoods.

3.4 PROTECTION

A. After installation, protect boxes from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

END OF SECTION 260533.16

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SECTION 260533.23 - SURFACE RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Surface type raceways including wireways and troughs and auxiliary gutters.

1. Surface metal raceways and fittings.
2. Surface nonmetallic raceways.
3. Strut-type channel raceways and fittings.
4. Wireways and auxiliary gutters.

B. Products Installed, but Not Furnished, under This Section:

1. See Section 260553 "Identification for Electrical Systems" for electrical equipment labels.

C. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 ACTION SUBMITTALS

A. Product Data: Manufacturer’s cut sheet for each type of product used on project.

PART 2 - PRODUCTS

2.1 PERFORMANCE CRITERIA

A. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

B. Listing Criteria as Applicable:

1. UL 94 – Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.

2. UL 870 – Standard for Wireways, Auxiliary Gutters, and Associated Fittings.
3. UL CCN ZOYX – Wireway, Auxiliary Gutters and Associated Fittings.

2.2 WIREWAYS AND AUXILIARY GUTTERS

A. Metallic:

1. NEMA 1 Type: Painted steel, gasketed, hinged cover, stainless steel hardware. Square Duct as manufactured by Schneider Electric or equal.
2. NEMA 4X Type: Stainless steel, Type 316, gasketed, hinged and clamped cover with drip lip, stainless steel hardware. Hoffman Bulletin F22 by nVent or equal.

B. Nonmetallic:

1. NEMA 3R Type: Fiberglass, gasketed, hinged cover, stainless steel hardware. Hoffman Fiberglass Hinged-Cover Wiring Trough by nVent or equal.

2.3 SURFACE METAL RACEWAYS AND FITTINGS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.
2. Listing Criteria: UL CCN RJBT; including UL 5.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.
3. Samples:

    a. Surface Metallic Raceway Nonmetallic Cover Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type, 12 inch (300 mm) or as indicated on Drawings .

C. UL RJBT - Surface Metal Raceways and Fittings with Metal Covers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
    b. MonoSystems, Inc.
    c. Wiremold; Legrand North America, LLC.
    d. Or equal.

2. Options:

    a. Aluminum base with snap-on covers.
    b. Manufacturer's standard enamel finish in color selected by Architect.
    c. Wiring Channels: Single, Dual, or Triple. Multiple channels must be capable of housing a standard 20 to 30 A device flush within the raceway.

D. UL RJBT - Surface Metal Raceways and Fittings with Nonmetallic Covers:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. Union Products International, Inc.
    b. Or equal.

2. Additional Characteristics: UL 94, V-0 requirements for self-extinguishing characteristics.
3. Options:

    a. Aluminum base with snap-on covers.
    b. Provide texture and color selected by Architect from custom colors.
    c. Wiring Channels: Single, Dual, or Triple. Multiple channels must be capable of housing a standard 20 to 30 A device flush within the raceway.

2.4 SURFACE NONMETALLIC RACEWAYS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

2. Listing Criteria:

    a. UL CCN RJTX; including UL 5A.
    b. UL 94, V-0 requirements for self-extinguishing characteristics.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.

2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.
3. Samples:

    a. Surface Nonmetallic Raceway Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type, dimension as per Drawings.

C. UL RJTX - Surface Nonmetallic Raceways and Fittings with Nonmetallic Covers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. HellermannTyton.
b. Hubbell Premise Wiring; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
c. Panduit Corp.
d. Wiremold; Legrand North America, LLC.
e. Or equal.

2. Options:

a. Provide texture and color selected by Architect from custom colors.
b. Wiring Channels: Single or Dual. Multiple channels must be capable of housing a standard 20 to 30 A device flush within the raceway.

D. UL RJTX - Surface Nonmetallic Raceways and Fittings with Metallic Covers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. HellermannTyton.
b. Hubbell Premise Wiring; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
c. Panduit Corp.
d. Wiremold; Legrand North America, LLC.
e. Or equal.

2. Options:

a. Manufacturer's standard enamel finish in color selected by Architect.
b. Wiring Channels: Single or Dual. Multiple channels must be capable of housing a standard 20 to 30 A device flush within the raceway.

2.5 STRUT-TYPE CHANNEL RACEWAYS AND FITTINGS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.
2. Listing Criteria:

a. UL CCN RIUU; including UL 5B.
b. UL 94, V-0 requirements for self-extinguishing characteristics.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.

2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.
3. Samples:

a. Strut-Type Channel Raceway Nonmetallic Covers for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type, dimension as per Drawings.

C. UL RIUU - Strut-Type Channel Raceways and Fittings with Metallic Covers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Atkore Unistrut.
c. Cooper B-line; brand of Eaton, Electrical Sector.
d. Power-Strut; Atkore International.
e. Or equal.

2. Options:

a. Manufacturer's standard enamel finish in color selected by Architect.

D. UL RIUU - Strut-Type Channel Raceways and Fittings with Nonmetallic Covers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Atkore Unistrut.
c. Cooper B-line; brand of Eaton, Electrical Sector.
d. Power-Strut; Atkore International.
e. Or equal.

2. Additional Characteristics: UL 94, V-0 requirements for self-extinguishing characteristics.
3. Options:

a. Provide texture and color selected by Architect from custom colors.

2.6 WIREWAYS AND AUXILIARY GUTTERS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.
2. Listing Criteria:

    a. UL CCN ZOYX; including UL 870.
    b. UL 94, V-0 requirements for self-extinguishing characteristics.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.

2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.
3. Samples:

    a. Nonmetallic Wireway and Auxiliary Gutter Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type, dimensions as per Drawings.

C. UL ZOYX - Metal Wireways and Auxiliary Gutters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABB, Electrification Business.
    b. Cooper B-line; brand of Eaton, Electrical Sector.
    c. Hoffman; brand of nVent Electrical plc.
    d. Square D; Schneider Electric USA.
    e. Or equal.

2. Additional Characteristics:

    a. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
    b. Finish: Manufacturer's standard enamel finish.

3. Degree of protection:

    a. Type 1 gasketed unless otherwise indicated.
    b. Locations Exposed to Corrosive Agents: Type 4X.
    c. Damp or Dusty Locations: Type 12.:
    d. Wireway Covers: Hinged type unless otherwise indicated.

D. UL ZOYX - Nonmetallic Wireways and Auxiliary Gutters:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Hoffman; brand of nVent Electrical plc.
b. Or equal.

2. Additional Characteristics:

a. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings must match and mate with wireways as required for complete system.
b. PVC Solvents and Adhesives: As recommended by wireway manufacturer.

3. Options:

a. Material:

1) Fiberglass polyester, extruded and fabricated to required size and shape, without holes or knockouts. Cover must be gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections must be flanged and have stainless steel screws and oil-resistant gaskets.
2) PVC, extruded and fabricated to required size and shape, and having snap-on cover, mechanically coupled connections, and plastic fasteners.

PART 3 - EXECUTION

3.1 INSTALLATION OF SURFACE RACEWAYS FOR ELECTRICAL SYSTEMS

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation: Unless more stringent installation requirements are specified in Contract Documents or manufacturers' published instructions, comply with the following:

1. Auxiliary Gutters: Article 366 of NFPA 70.
2. Metal Wireways: Article 376 of NFPA 70.
3. Surface Metal Raceway: Article 386 of NFPA 70.
4. Surface Nonmetallic Raceway: Article 388 of NFPA 70.

C. Special Installation Techniques:

1. Install surface raceways or wireways and gutters as indicated on Drawings or when approved by Engineer.
2. Install surface raceways only where indicated on Drawings.
3. Install surface raceway with a minimum 2 inch radius control at bend points.
4. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section.

Support surface raceway in accordance with manufacturer's published instructions. Tape and glue are unacceptable support methods.

5. Identification: Provide labels for surface raceways and associated electrical equipment.

3.2 CLEANING

A. Remove construction dust and debris from surface raceways before installing wires and again when installing covers.

3.3 PROTECTION

A. After installation, protect surface raceways from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

END OF SECTION 260533.23

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SECTION 260543 - UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes Handholes and Duct accessories.

B. Products Installed, but Not Furnished, under This Section:

1. Section 260533.13 “Conduits for Electrical Systems” for conduits.
2. Section 260553 "Identification for Electrical Systems" for underground-line warning tape.

C. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Division 03 for concrete and reinforcing steel.
3. Division 31 for groundwater control, trenching, excavation and backfilling including gravel and sand bedding, and surface restoration.

1.3 DEFINITIONS

A. Duct: A single raceway or multiple raceways, installed singly or as components of a duct bank.

B. Duct Bank: Two or more ducts installed in parallel, direct buried or with additional casing materials such as concrete.

C. Handhole: An underground chamber containing electrical cables, sized such that personnel are not required to enter in order to access the cables.

D. Manhole: An underground chamber containing electrical cables and equipment, sized to provide access with working space clearances.

E. Trafficways: Locations where vehicular or pedestrian traffic is a normal course of events.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include duct-bank materials, including spacers and miscellaneous components.
2. Include accessories for handholes.
3. Include underground-line warning tape.
4. Duct accessories.
5. Handholes and boxes for exterior underground wiring.

B. Shop Drawings:

1. Handholes:

a. Include plans, elevations, sections, details, and accessories.
b. Include duct entry provisions showing locations and duct sizes.
c. Include frame, cover, entry extensions if applicable, and grounding details.
d. Include dimensioned locations of cable rack inserts, pulling-in and lifting irons, and sumps.

2. Underground Conduit Layouts: In accordance with Section 260533.13 “Conduits for Electrical Systems.”

1.5 INFORMATIONAL SUBMITTALS

A. Field quality control reports.

B. Certificates: For concrete and steel used in precast concrete handholes, as required by ASTM C858.

PART 2 - PRODUCTS

2.1 CONDUIT AND FITTINGS

A. Comply with Section 260533.13 “Conduits for Electrical Systems” for conduits and fittings.

2.2 DUCT ACCESSORIES

A. Duct Spacers: Factory-fabricated, rigid, PVC interlocking spacers; sized for type and size of duct with which used and selected to provide minimum duct spacing indicated while supporting duct during concreting or backfilling.

B. Underground-Line Warning Tape: In accordance with Section 260553 "Identification for Electrical Systems."

2.3 PRECAST CONCRETE HANDHOLES AND BOXES

A. Description: Factory-fabricated, reinforced-concrete, monolithically poured walls and bottom unless open-bottom enclosures are indicated. Frame and cover must form top of enclosure and must have load rating consistent with that of handhole or box.

1. Load Rating: Class H-20.
2. Cover Legend: “ELECTRIC”, unless otherwise indicated.
3. Comply with details shown on Drawings.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Oldcastle Infrastructure.

C. Comply with ASTM C 858 “Standard Specification for Underground Precast Concrete Utility Structures” for design and manufacturing process.

D. Joint Sealant: Asphaltic-butyl material with adhesion, cohesion, flexibility, and durability properties necessary to withstand maximum hydrostatic pressures at the installation location with the ground-water level at grade.

2.4 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics:

a. ASTM C858 for design and manufacturing processes.
b. SCTE 77.

2.5 SOURCE QUALITY CONTROL

A. Product Data: Prepare and submit catalog cuts, brochures, diagrams, schedules, and performance data illustrating size, physical appearance, and other characteristics of product.

1. Duct-bank materials, including spacers and miscellaneous components.
2. Ducts, conduits, and their accessories, including elbows, end bells, bends, fittings, and solvent cement.
3. Accessories for handholes, boxes.
4. Underground-line warning tape.
5. Warning planks.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate layout and installation of duct, duct bank, manholes, handholes, and boxes with final arrangement of other utilities, site grading, and surface features as determined in field. Notify Engineer if there is conflict between areas of excavation and existing structures or archaeological sites to remain.

B. Coordinate elevations of duct and duct-bank entrances into manholes, handholes, and boxes with final locations and profiles of duct and duct banks, as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations as required to suit field conditions and to ensure that duct and duct bank will drain to manholes and handholes, and as approved by Engineer.

3.2 SELECTION OF UNDERGROUND DUCTS

A. Direct Buried Duct: Type PVC-80 rigid non-metallic conduit, with RMC long radius sweep elbows.

B. Concrete Encased Duct: Type PVC-40 rigid non-metallic conduit, with RMC long radius sweep elbows.

C. Rigid Metal Conduit (RMC) type in accordance with Section 260533.13 “Conduits for Electrical Systems” with two coats of bitumastic paint or PVC coated where:

1. Direct buried conduit enters buildings, structures, and vaults (except manholes and handholes) with not less than a 10-foot length of conduit.
2. Direct buried conduits run below floor slabs in slab-on-grade construction.
3. Stub-ups outdoors or through concrete slabs.

3.3 EARTHWORK

A. Excavation and Backfill: Comply with Section 312000 "Earthwork," but do not use heavy-duty, hydraulic-operated, compaction equipment.

B. Restoration: Restore area immediately after backfilling is completed or after construction vehicle traffic in immediate area is complete.

C. Restore surface features at areas disturbed by excavation and re-establish original grades unless otherwise indicated. Replace removed sod immediately after backfilling is completed.

D. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching.

E. Cut and patch existing pavement in path of underground duct, duct bank, and underground structures.

3.4 INSTALLATION OF DUCTS AND DUCT BANKS

A. Reference Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NEMA TCB 2 for installation of underground ducts and duct banks.
2. Consult Engineer for resolution of conflicting requirements.

B. General Requirements:

1. Comply with installation requirements for conduits in Section 260533.13 “Conduits for Electrical Systems” and as supplemented herein.
2. Ductbank routing and manhole / handhole locations indicated on Drawings are diagrammatically depicted. Coordinate with other utilities, yard piping, yard structures and field conditions to determine required paths and depths at no additional cost to Owner.
3. Where conditions do not allow neat and consistent duct bank cross sections in accordance with Drawings due to existing underground conflicts, provide Engineer with proposed solution for approval that complies with minimum NEC installation cover requirements. For example, where the Drawings indicate direct buried PVC conduits are to be installed at a certain depth below finished grade, a concrete cap or concrete encasement may be permitted to achieve an equivalent protection. Do not deviate from Drawing details without Engineer approval.
4. Reinforce ductbanks as indicated on Drawings. Arrange reinforcing rods and ties without forming conductive or magnetic loops around ducts or duct groups.
5. Separate underground copper signal conduits (instrumentation and telecommunication) from power conduits by a minimum of 12 inches unless noted otherwise. Keep crossing of these conduits to a minimum; cross at 90-degree angles.
6. Plug conduit ends during and after installation to prevent water, mud, and debris from entering conduit.
7. After duct installation is complete and before any cables are pulled, remove obstructions using appropriately sized mandrel for conduits 2 inch and larger. Swab clean interior of all sized conduits. Refer to CLEANING Article.

C. Special Techniques:

1. Where indicated on Drawings, install duct, spacers, and accessories into duct-bank configuration shown. Duct installation requirements in this Section also apply to duct bank.
2. Slope: Pitch duct minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope duct from high point between two manholes to drain in both directions.
3. Curves and Bends: Use long radius elbows, sweeps, and offsets for 2 inch and larger conduits.
4. Joints: Use solvent-cemented joints in nonmetallic duct and fittings and make watertight in accordance with manufacturer's published instructions. Stagger couplings so those of adjacent duct do not lie in same plane.
5. Terminations at Manholes: Use end bells for PVC conduit and insulated throat grounding bushings with lay-in type lugs for RMC.
6. Building Wall Penetrations: Make transition from underground duct to RMC at least 10 feet outside building wall, without reducing duct line slope away from building and without forming trap in line. Use fittings manufactured for transition to RMC type installed. Install RMC penetrations of building walls as specified in drawings.

7. Underground-Line Warning Tape: Bury underground line specified in Section 260553 "Identification for Electrical Systems" above concrete-encased duct and direct buried duct banks as shown on detail Drawings. Align tape parallel to and within 3 inches of centerline of duct bank. Provide additional warning tape for each 12-inch increment of duct-bank width over nominal 18 inches. Space additional tapes 12 inches apart, horizontally across width of ducts.
8. Ground ducts and duct banks in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

D. Concrete-Encased Ducts and Duct Bank Special Techniques:

1. Excavate trench bottom to provide firm and uniform support for duct. Prepare trench bottoms as specified in Section 312000 "Earthwork" for pipes 6 inches or less in nominal diameter.
2. Depth: Install so top of duct envelope is as shown on detail Drawing.
3. Support duct on duct spacers coordinated with duct size, duct spacing, and outdoor temperature.
4. Spacer Installation: Place spacers close enough to prevent sagging and deforming of duct, with not less than five spacers per 20 feet of duct. Place spacers within 24 inches of duct ends. Stagger spacers approximately 6 inches between tiers. Secure spacers to earth and to duct to prevent floating during concreting. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
5. Forms: Use walls of trench to form side walls of duct bank where soil is self-supporting and concrete envelope can be poured without soil inclusions; otherwise, use forms.
6. Concreting Sequence: Pour each run of envelope between manholes or other terminations in one continuous operation.

    a. Start at one end and finish at other, allowing for expansion and contraction of duct as its temperature changes during and after pour. Use expansion fittings installed in accordance with manufacturer's published instructions or use other specific measures to prevent expansion-contraction damage.
    b. If more than one pour is necessary, terminate each pour in vertical plane and install 3/4 inch reinforcing-rod dowels extending minimum of 18 inches into concrete on both sides of joint near corners of envelope.

7. Pouring Concrete: Place concrete carefully during pours to prevent voids under and between duct and at exterior surface of envelope. Do not allow heavy mass of concrete to fall directly onto ducts. Allow concrete to flow around duct and rise up in middle, uniformly filling open spaces. Do not use power-driven agitating equipment unless specifically designed for duct-installation application.
8. Concrete Color: Red. Dye color added to concrete during batching; or dye mixed with water and applied to top of ductbank with a sprayer while concrete is wet (prior to curing); or raked into the exposed top layer of concrete.

E. Direct-Buried Duct and Duct Bank Special Techniques:

1. Excavate trench bottom to provide firm and uniform support for duct. Comply with requirements in Section 312000 "Earthwork" for preparation of trench bottoms for pipes less than 6 inch in nominal diameter.
2. Depth: Install top of duct as shown on detail Drawing.

3. Support ducts on duct spacers coordinated with duct size, duct spacing, and outdoor temperature.
4. Spacer Installation: Place spacers close enough to prevent sagging and deforming of duct, with not less than five spacers per 20 feet of duct. Place spacers within 24 inches of duct ends. Stagger spacers approximately 6 inches between tiers. Secure spacers to earth and to ducts to prevent floating during backfill. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
5. After installing first tier of duct, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand place backfill to 4 inches over duct and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction. Comply with requirements in Section 312000 "Earthwork" for installation of backfill materials.

3.5 INSTALLATION OF BOXES OTHER THAN PRECAST CONCRETE

A. Special Techniques:

1. Install boxes level and plumb and with orientation and depth coordinated with connecting duct, to minimize bends and deflections required for proper entrances. Use box extension if required to match depths of duct, and seal joint between box and extension as recommended by manufacturer.
2. Unless otherwise indicated, support units on level bed of crushed stone or gravel, graded from 1/2 inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
3. Elevation: In paved areas and trafficways, set cover flush with finished grade..
4. Install boxes with bottom below frost line, below grade.
5. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in enclosure.
6. Field cut openings for duct in accordance with enclosure manufacturer's published instructions. Cut wall of enclosure with tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.
7. Ground boxes in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

3.6 FIELD QUALITY CONTROL

A. Nonconforming Work:

1. Underground ducts, raceways, and structures will be considered defective if they do not pass tests and inspections.
2. Correct deficiencies and retest as specified above to demonstrate compliance.

B. Field Quality-Control Reports: Collect, assemble, and submit test and inspection reports.

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3.7 CLEANING

A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of duct until duct cleaner indicates that duct is clear of dirt and debris. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.

1. Sweep floor, removing dirt and debris.
2. Remove foreign material.

END OF SECTION 260543

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SECTION 260548 - VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Elastomeric isolation pads.
2. Restraints - rigid type.
3. Restraints - cable type.
4. Restraint accessories.
5. Post-installed concrete anchors.
6. Concrete inserts.

B. Not all components specified in this Section are necessarily utilized on this project. Verify components needed per Drawings and Specifications.

C. Related Requirements:

1. Section 018829 “Seismic Performance Requirements” for submittals, performance requirements and installation.
2. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definition, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
3. Section 260529 "Hangers and Supports for Electrical Systems" for commonly used electrical supports and installation requirements.

PART 2 - PRODUCTS

2.1 ELASTOMERIC ISOLATION PADS

A. Elastomeric Isolation Pads: .

1. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
2. Size: Factory or field cut to match requirements of supported equipment.
3. Pad Material: Oil and water resistant with elastomeric properties. Neoprene rubber, silicone rubber, or other elastomeric material.
4. Surface Pattern: Smooth, ribbed, or waffle pattern.

2.2 RESTRAINTS - RIGID TYPE

A. Description: Shop- or field-fabricated bracing assembly made of ANSI/AISI S110-07-S1 slotted steel channels, ANSI/ASTM A53/A53M steel pipe, or other rigid steel brace member. Includes accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

2.3 RESTRAINTS - CABLE TYPE

A. Seismic- and Wind-Load-Restraint Cables: ASTM A492 stainless steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for seismic-restraining cable service; with fittings attached by means of poured socket, swaged socket, or mechanical (Flemish eye) loop.

B. Restraint cable assembly and cable fittings must comply with ASCE/SEI 19. Cable fittings and complete cable assembly must maintain the minimum cable breaking force. U-shaped cable clips and wedge-type end fittings do not comply and are unacceptable.

2.4 RESTRAINT ACCESSORIES

A. Hanger-Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod. Non-metallic stiffeners are unacceptable.

B. Hinged and Swivel Brace Attachments: Multifunctional steel connectors for attaching hangers to rigid channel bracings and restraint cables.

C. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.

D. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices used.

E. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

2.5 POST-INSTALLED CONCRETE ANCHORS

A. Mechanical Anchor Bolts:

1. Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength for anchor and as tested according to ASTM E488/E488M.

B. Adhesive Anchor Bolts:

1. Drilled-in and capsule anchor system containing PVC or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts

and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E488/E488M.

C. Provide post-installed concrete anchors that have been prequalified for use in seismic and wind-load applications.

1. Prequalify post-installed anchors in concrete in accordance with ACI 355.2 or other approved qualification testing procedures.
2. Prequalify post-installed anchors in masonry in accordance with approved qualification procedures.

D. Expansion-type anchor bolts are not permitted for equipment in excess of 10 hp that is not vibration isolated.

1. Undercut expansion anchors are permitted.

2.6 CONCRETE INSERTS

A. Provide preset concrete inserts that are seismically prequalified in accordance with ICC-ES AC446 testing.

B. Comply with MSS SP-58.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install seismic and/or wind restraint components in accordance with Division 01 requirements.

END OF SECTION 260548

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SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Identification products along with color and legend requirements.

B. Related Requirements:

1. .
2. Section 260573 “Power System Studies” for arc flash study labels.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Note that not all products listed may be utilized on this project.

B. Identification Schedule: For each piece of electrical equipment and electrical system components to be index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with ASME A13.1 and IEEE C2.

B. Comply with 29 CFR 1910.144 for color identification of hazards; 29 CFR 1910.145 for danger, caution, warning, and safety instruction signs and tags; and the following where applicable:

1. Fire-protection and fire-alarm equipment, including raceways, must be finished, painted, or suitably marked safety red.
2. Ceiling-mounted hangers, supports, cable trays, and raceways must be finished, painted, or suitably marked safety yellow where less than 7.7 feet above finished floor.

C. Signs, labels, and tags required for personnel safety must comply with the following standards:

1. Safety Colors: NEMA Z535.1.

2. Facility Safety Signs: NEMA Z535.2.
3. Safety Symbols: NEMA Z535.3.
4. Product Safety Signs and Labels: NEMA Z535.4.
5. Safety Tags and Barricade Tapes for Temporary Hazards: NEMA Z535.5.

D. Comply with NFPA 70E and Section 260573 "Power System Studies" requirements for arc-flash warning labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, must comply with UL 969.

F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 degrees F, ambient; 180 degrees F, material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 1000 V or Less:

1. Black letters on orange field.
2. Legend: Indicate voltage and system or service type.

B. Color-Coding for Phase- and Voltage-Level Identification, 1000 V or Less: Use colors listed for conductors.

1. Color must be factory applied or field applied for sizes larger than 8 AWG.
2. Colors for 208Y/120 V Circuits:

a. Phase A: Black.
b. Phase B: Red.
c. Phase C: Blue.
d. Neutral: White.

3. Colors for 240/120 V Circuits (Single Phase):

a. Phase A: Black.
b. Phase B: Red.
c. Neutral: White.

4. Colors for 240Δ/120 V Circuits (Three Phase, Four Wire, High Leg, Center Tap):

a. Phase A: Black.
b. Phase B: Orange (high leg).
c. Phase C: Blue.
d. Neutral: White.

5. Colors for 480Y/277 V Circuits:

a. Phase A: Brown.
b. Phase B: Orange.

c. Phase C: Yellow.
d. Neutral: Gray.

6. Colors for DC Circuits:

a. Positive: Red.
b. Negative: Black.

7. Color for Equipment Grounding Conductors: Green.
8. Color for Equipment Grounds: Bare copper or Green.

C. Warning Label Colors:

1. Identify system voltage with black letters on orange background.

D. Warning labels and nameplates/signs must include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 3 FEET MINIMUM."

E. Equipment Identification and Source Nameplate:

1. Color: White letters on a black field.
2. Material: See NAMEPLATES Article.
3. Equipment furnished under Divisions 26, 27, 28 and equipment control panels furnished under other Divisions must include equipment identification nameplates. Equipment includes, but is not limited to switchgear, switchboards, motor control centers, panelboards, transformers, disconnect switches, separately mounted motor controllers, transfer switches, control panels, and named enclosures or cabinets. Nameplate to match designation indicated on Drawings.
4. Power source must be identified at all applicable equipment. Nameplate may be separate from identification nameplate or information may be contained on one nameplate. For example, a local disconnect switch for exhaust fan motor could have one nameplate reading “EF-3” for the identification nameplate and a second nameplate reading “FED FROM SWBD-OB”. Or a two-line nameplate combining the information for both identification and source.

F. Device Identification Labels:

1. Color: Black letters on a white field. In office areas only, black letters on a clear field.
2. Material: Self-adhesive type, machine generated, 1/4-inch-high letters.
3. Devices to be labeled with panel and branch circuit number include receptacles, wall switches, lighting fixtures, photocells, emergency lights, exit lights, instruments, etc. For example, a light switch powered from panelboard LP-2 and branch circuit 4 would have the label “LP-2/4” or “LP-2/CKT 4”.

2.3 NAMEPLATES

A. Material:

1. Engraved, engraved plastic (lamicoid).
2. Minimum size: Not less than 1/16 inch thick by 3/4 inch high by 2-1/2 inches wide.
3. Lettering: Upper case, 3/16 inches high minimum.

2.4 LABELS, BANDS, TUBES, AND SLEEVES

A. Self-Adhesive Wraparound Labels: Machine-printed, 3 mil thick, polyester or vinyl flexible label with acrylic pressure-sensitive adhesive. Printed text is black, permanent, and waterproof.

1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over legend. Labels sized such that clear shield overlaps entire printed legend.

B. Self-Adhesive Labels: Polyester or Vinyl, thermal, transfer-printed, 3 mil thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

C. Heat-Shrink Preprinted Tubes (Sleeve Type): Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at maximum of 200 degrees F. Comply with UL 224. Printed text is black, permanent, and waterproof.

2.5 TAPES

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mil thick by 1 to 2 inches wide; compounded for outdoor use.

C. Underground-Line Warning Tape:

1. Tape:

a. Recommended by manufacturer for method of installation and suitable to identify and locate underground electrical and communications utility lines.
b. Printing on tape must be permanent and may not be damaged by burial operations.
c. Tape material and ink must be chemically inert and not be subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.

2. Color and Printing:

a. Comply with APWA Uniform Color Code using NEMA Z535.1 safety colors.
b. Inscriptions for Red Tapes: "CAUTION BURIED ELECTRIC LINE BELOW".
c. Inscriptions for Orange Tapes: "CAUTION BURIED COMMUNICATION LINE BELOW".

3. Detectable Tape:

   a. Detectable three-layer laminate, consisting of printed pigmented polyolefin film, solid aluminum-foil core, and clear protective film that allows inspection of continuity of conductive core; bright colored, continuous-printed on one side with inscription of utility, compounded for direct-burial service.
   b. Width: 6 inches.
   c. Overall Thickness: 5 mil.
   d. Foil Core Thickness: 0.35 mil.

2.6 TAGS

A. Metal Tags: Embossed, Type 316 stainless steel, 0.01 inch thick, punched for use with tie fastener. Secure with 0.048-inch diameter stainless steel band fastened with compression wire clamps

B. Nonmetallic Preprinted Tags: Polyester or Polyethylene tags, 0.015 inch thick, color-coded for phase and voltage level, with factory screened permanent designations; punched for use with self-locking cable tie fastener.

2.7 CABLE TIES

A. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 degrees F in accordance with ASTM D638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 degrees F.
4. Color: Black.

2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Nameplates/Signs: Self-tapping, stainless steel screws or stainless steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 SELECTION OF IDENTIFICATION PRODUCTS

A. Power-Circuit Conductor Identification, 1000 V or Less: For conductors at termination points and in vaults, pull and junction boxes, manholes, and handholes, use self-adhesive vinyl tape if conductor is not factory colored to identify phase, neutral, and ground conductors. Use self-adhesive labels to identify circuit.

B. Power-Circuit Conductor Identification, More Than 1000 V: For conductors at termination points and in vaults, pull and junction boxes, manholes, and handholes, use self-adhesive vinyl tape to identify phase conductors. Use nameplate or nonmetallic tag secured with cable ties to indicate phase and indicate circuit designation.

C. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with conductor or cable designation, origin, and destination.

D. Control-Circuit Conductor Termination Identification: For identification at terminations, provide heat-shrink preprinted tubes or self-adhesive labels with conductor designation.

E. Spare Conductors or Cables: Attach nonmetallic tags or self-adhesive labels to conductors and list source.

F. SCADA Systems, Communication Systems, Fire Alarm Systems or Other Auxiliary Electrical Systems Conductor Identification: For identification at terminations, provide heat-shrink preprinted tubes or self-adhesive labels with conductor designation.

G. Conduit Identification: For designated identification as indicated on Drawings provide metal tags.

H. Pull Boxes and Junction Boxes, 24 inches by 24 inches and Larger: For voltage identification provide nameplates using 1 inch high minimum letters, white letters on red background.

I. Equipment Identification: For identification and source information provide nameplate(s) per COLOR AND LEGEND REQUIREMENTS Article.

J. Device Identification: For source and circuit information provide self-adhesive label per COLOR AND LEGEND REQUIREMENTS Article.

3.3 INSTALLATION

A. Install identification product in accordance with manufacturer’s instructions.

B. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

D. Verify identity of item before installing identification products.

E. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

F. Apply identification devices to surfaces that require finish after completing finish work.

G. Apply wire markers so entire designation is clearly visible.

H. Install Arc Flash Labels in accordance with Section 250573 “Power System Studies”.

I. Identify the system voltage (e.g. 208/120 VOLTS, 480 VOLTS) at the covers of large pull boxes or junction boxes.

J. Install field device (instruments, receptacles, switches, etc.) labels.

K. Install equipment nameplates. Nameplate fastening requirements:

1. NEMA 1 and 12 Enclosures: Screw mounted using stainless steel screws.
2. Other Enclosure Types: Bonded using epoxy or similar permanent waterproof adhesive. Two sided foam adhesive tape is not acceptable.

L. Panelboard and Transformer Panel Assembly Identification:

1. Provide equipment identification nameplates as previously described.
2. Label branch circuit phase and neutral wires with associated pole number using self-adhesive labels or type written sleeve type labels.
3. Install typed as built circuit directory listing with unique load identification.

M. Underground Line Warning Tape:

1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in common trench or concrete envelope exceeds 18 inch overall.
2. Install underground-line warning tape for direct-buried cables and cables in raceways.

N. Install Tags. Fastening Requirements:

1. Secure metal tags using stainless steel ties.
2. Secure nonmetallic tags with UV-stabilized cable ties.

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SECTION 260573 - POWER SYSTEM STUDIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.2 SUMMARY

A. Section includes a computer-based study for:

1. Short circuit report.
2. Protective device coordination report.
3. Arc flash report.

B. Study encompasses the power distribution system of the City of Redlands, Redlands Wastewater Treatment Plant. Facility is located at 1950 Nevada St, Redlands, CA 92373.

C. Provide power studies up to 480V SWBD M. Provide new arc flash labels for SWBD, Panelboards, VFDs and disconnect switches.

D. The facility power system study was conducted in 2016. This study can be requested from the owner before performing a new study.

E. Study includes distribution to new HVAC equipment, existing and new panelboards. All power distribution to that point whether existing or new is included. Existing and new equipment included, but not limited to:

1. Switchboards, and panelboards.
2. Disconnect switches.

F. The local electric utility is Electric – Southern California Edison**.**

G. Obtain all data necessary to perform the study. Data included, but not limited to:

1. Up to date one-line diagrams.
2. Equipment data.
3. Cable sizes and lengths.
4. Existing protective device settings.

5. Electric utility information: available fault current, protective device equipment information and settings, X/R ratios, transformer impedances and ratings.

1.3 DEFINITIONS

A. Boundary, Arc Flash: When an arc flash hazard exists, an approach limit from an arc source at which the incident energy equals 1.2 cal/cm² (5 J/cm²).

B. Boundary, Limited Approach: An approach limit at a distance from an exposed energized electrical conductor or circuit part within which a shock hazard exists.

C. Boundary, Restricted Approach: An approach limit at a distance from an exposed energized electrical conductor or circuit part within which there is an increased likelihood of electric shock, due to electrical arc-over combined with inadvertent movement.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed and salvaged, or removed and reinstalled. Existing items to remain functional throughout the construction period.

E. Field Adjusting Agency: An independent electrical testing agency with full-time employees and the capability to adjust devices and conduct testing indicated and that is a member company of NETA.

F. One-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.

G. Power System Analysis Software Developer: An entity that commercially develops, maintains, and distributes computer software used for power system studies.

H. Power Systems Analysis Specialist: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located.

I. Preliminary Short Circuit Report: Report that includes the maximum available utility fault current, proposed equipment, and existing equipment to determine if new equipment may be released for manufacturing and existing equipment is adequate for the calculated short circuit levels.

J. Protective Device: A device that senses when an abnormal condition or current flow exists and then removes the affected portion of the circuit from the system.

K. SCCR: Short-circuit current rating.

L. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

M. Single-Line Diagram: See "One-Line Diagram."

N. Supplier: The person, firm or corporation identified as such to provide the power system study and means the Supplier or its authorized agent. See also Power Systems Analysis Specialist.

1.4 ACTION SUBMITTALS

A. Supplier qualifications per Quality Assurance paragraph. Submit prior to starting study. Include the following:

1. Brief description of each qualifying study.
2. Name of owner of installation on which study was performed with address, telephone number, and contact person.
3. Date of study.
4. Any other information indicating the firm's experiences and ability to perform the work and business status.

B. Preliminary Power System Study Report. Report must be approved prior to release for manufacture of major electrical equipment including but not limited to existing switchgear, motor control centers, generator and all panelboards as well as new switchboard, and panelboard. Fault data from the utility must be included and not assumed or submittal will be rejected.

C. Final Power System Study Report. Report must be approved prior to energization of new major electrical equipment. Revise study as required for changes during construction.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data:

1. For Power Systems Analysis Software Developer.
2. For Power System Analysis Specialist.
3. For Field Adjusting Agency.

B. If requested, Product Certificates: For power system study software, certifying compliance with IEEE 399, IEEE 1584 and NFPA 70E.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Final power system study updated with any changes made after equipment start-up.

B. Digital computer files with full read-write access of the complete power system model and library.

1.7 QUALITY ASSURANCE

A. Perform Study using commercially developed and distributed software designed specifically for power system analysis.

B. Software algorithms comply with requirements of standards and guides specified in this Section.

C. Manual calculations are unacceptable.

D. Power System Analysis Software Qualifications:

1. Design computer program to perform short-circuit studies or have a function, component, or add-on module designed to perform short-circuit studies.
2. Develop computer program under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.
3. Complies with IEEE 399, IEEE 141, IEEE 242, IEEE 519, IEEE 1015, and IEEE 1584 as applicable to the project scope.

E. Power Systems Analysis Specialist Qualifications: Professional engineer licensed in the state where Project is located and has regularly engaged in this electrical engineering study specialty for minimum of five years and has performed at least three projects of similar complexity to this project within the last three years. Perform all elements of the study under the direct supervision and control of this professional engineer. Specialist is professionally independent of the manufacturers, suppliers, and installers of the equipment under evaluation.

F. Power System Study Certification: Power Systems Analysis Specialist signs and seals the Report.

G. Field Adjusting Agency Qualifications:

1. Employer of a NETA ETT-Certified Technician Level III or NICET Electrical Power Testing Level III certification responsible for all field adjusting of the Work.
2. A member company of NETA.
3. Acceptable to authorities having jurisdiction.

1.8 POWER SYSTEM STUDY MEETINGS

A. Supplier's professional engineer responsible for the study to attend a meeting with the Engineer and Owner at the Owner's facility up to and including three times.

B. Purpose of the three meetings is:

1. Initial meeting discusses the study's scope and the Owner's operational and maintenance requirements prior to the preliminary study submittal.
2. Second meeting discusses the preliminary study and its recommendations. Based on this meeting, the Owner may request modifications to the studies' recommended protective settings to reduce the arc flash hazard or meet other operational objectives.
3. Third and final meeting presents the final study and its recommendations.

C. Provide a minimum of three-week notice to the Owner and Engineer in advance of all projected meeting dates.

PART 2 - PRODUCTS

2.1 POWER SYSTEM ANALYSIS SOFTWARE DEVELOPERS

A. Acceptable Software:

1. SKM System Analysis, Inc.: Power*Tools.
2. Operation Technology, Inc.: ETAP (Electrical Transient Analyzer Program).
3. EasyPower, Inc.: EasyPower.

2.2 POWER SYSTEM STUDY REPORT GENERAL REQUIREMENTS

A. Except for one-line diagrams, standard 8 1/2-inch by 11-inch pages, with total pages numbered.

B. Electronic PDF format copy with electronic bookmarks for each section.

C. Signed and sealed by a professional engineer registered in the state in which the project is located.

D. Organized in the following order:

1. Executive Summary.
2. Short Circuit Analysis.
3. Short Circuit Computer Printout.
4. Protective Device Coordination.
5. Arc Flash Hazard Analysis.
6. Utility Data.
7. Modeled One Line Diagrams.

E. Information on one-line diagrams, legible when printed on 11-inch by 17-inch pages. Show the following:

1. Protective device designations and ampere ratings.
2. Conductor types, sizes, and lengths.
3. Transformer kilovolt ampere (kVA), impedance, and voltage ratings.
4. Motor designations and kVA ratings.
5. Switchgear, switchboard, and panelboard designations and ratings.
6. Derating factors and environmental conditions.
7. Any revisions to electrical equipment required by the study.

F. Identifiers between the one-line diagram, short circuit study, coordination study, and arc flash study to be the same.

G. Include copies of correspondence with electric utility under utility data section of report. Correspondence to include names and contact information.

2.3 EXECUTIVE SUMMARY

A. Include summary of distribution system, information received from electric utility, major assumptions, adequacy of equipment to safely clear or close on any fault, identify problem areas and recommendations for resolving problem areas.

2.4 SHORT CIRCUIT

A. Comply with IEEE 399 and IEEE 551 (new 3002 series).

B. Include normal utility powered configuration, on-site generation configuration, and alternate modes of operation (i.e. alternate utility configuration, bus ties closed).

C. Include minimum and maximum possible fault conditions. Address three-phase bolted as well as ground fault conditions.

D. Consider the fault contribution of all motors operating during the maximum demand condition of the motors.

E. Calculate short-circuit momentary duties and interrupting duties based on an assumed bolted three-phase short circuit at switchboard, distribution panelboard, pertinent branch circuit panelboard and other significant locations throughout the new distribution systems. Include the X/R ratios, asymmetry factors, KVA and symmetrical fault-current in the short circuit tabulations. Provide a ground fault current study for the same system areas. Include in tabulations fault impedance, X/R ratios, asymmetry factors, motor contribution, short circuit KVA, and symmetrical and asymmetrical fault-currents.

F. Include representation of the site power system, the base quantities selected, impedance source data, calculation methods and tabulations, one-line diagrams, conclusions and recommendations.

G. Identify available fault current at each bus and evaluate system elements including but not limited to equipment, protective devices, and cables.

H. Base current transformers' ratio and burden calculations on a 10 percent maximum ratio error per IEEE C57.13. Identify current transformers that will not allow the protective devices to operate within acceptable IEEE error margins and recommend corrective action.

I. List momentary, interrupting, and/or withstand rating of all key elements of the distribution system along with the maximum available fault current in tabular form and clearly indicate the adequacy of the element with PASS / FAIL designation.

J. Short Circuit Computer Printout:

1. Show calculations in sufficient detail for easy review.
2. Back up calculations become part of the final report.

2.5 PROTECTIVE DEVICE COORDINATION

A. Comply with IEEE 242 (new 3004 series).

B. Utilize results from the short circuit study and balance the competing objectives of protection and continuity of service for the system specified, considering the basic factors of sensitivity, selectivity and speed. Include all system protective devices in the coordination analysis, not just overcurrent protective devices. This includes, but is not limited to, under and over voltage protective relays, frequency relays, differential relays and reverse power relays.

C. Show graphic indication of coordination between protective devices in the form of full color time-current coordination (TCC) plots with each protective device curve in a unique color for easy review.

D. Provide separate TCC plots for each mode of operation. Provide separate TCC plots for "normal" and "stand by" operation. Show maximum fault values in each case. Both power sources shown on one plot is unacceptable.

E. Provide separate TCC for phase over-current and ground fault.

F. Show no more than six devices on one TCC. Of these six curves, two (the largest upstream device and the smallest downstream device) repeat curves shown on other coordination plots to provide cross-reference. Designate each TCC with a unique identifier and include each TCC identifier and descriptive title in the study's table of contents.

G. Include in each TCC the following as applicable:

1. TCC name and description.
2. One-line diagram.
3. Identifiers on one-line diagram and curves.
4. Significant motor starting characteristics.
5. Appropriate NEC protection points.
6. Appropriate ANSI/IEEE protection points.
7. Magnetizing inrush points of transformers.
8. Transformer damage curves.
9. Complete operating bands for low voltage circuit breaker trip devices and fuses.
10. Relay coil taps, time-dial settings and pickup settings.
11. Significant symmetrical and asymmetrical fault currents.
12. Power cable withstand curves.
13. Generator short circuit decrement and thermal limit curves.

H. Terminate device characteristic curve on TCC at a point reflecting the maximum symmetrical or asymmetrical fault current to which that device is exposed, based on the short circuit study.

I. Select each primary protective device for a delta-to-wye-connected transformer so the characteristic or operating band is within the transformer parameters; where feasible, include a parameter equivalent to 58 percent of the ANSI C37.91 withstand curve to afford protection for secondary line-to-ground faults.

J. Separate low voltage power circuit breakers from each other and the associated primary protective device, by a 16 percent current margin for coordination and protection in the event of line-to-line faults.

K. Separate protective relays by a 0.3 second time margin for the maximum 3 phase fault conditions to assure proper selectivity.

L. Optimize settings for breakers and relays to provide the most effective protection practicable for all modes and power sources.

M. Include at least all devices down to largest branch circuit and largest feeder circuit breaker in each motor control center and/or power distribution panelboard. Include all adjustable setting ground fault protective devices.

N. Provide tabulations of recommended settings for all protective devices. Where devices are existing, highlight any changes from the existing setting to the proposed recommended setting.

O. Provide all information required to program/set multifunction solid state relays.

2.6 ARC FLASH HAZARD

A. Comply with IEEE 1584, NFPA 70, and NFPA 70E as applicable.

B. Utilize short circuit and protective device coordination results to provide arc flash hazard analysis. Perform calculations in accordance with IEEE 1584 or NFPA 70E with the method identified within the report.

C. Calculate the incident energy levels at each faulted bus for each mode of operation and for both maximum and minimum fault currents.

D. Include calculations at line side and load side of main breakers, where applicable.

E. Provide tabular report for all modes and conditions and include “worst case” summary. Use the “worst case” to generate the arc flash labels. Include:

1. Fault location.
2. Arcing fault magnitude.
3. Protective device clearing time.
4. Duration of the arc.
5. Arc flash boundary.
6. Working distance.
7. Incident energy.
8. Electrode configuration.

F. Highlight any available incident energy over 40 cal/cm² and provide recommendations to mitigate the hazard.

G. Arc Flash Labels:

1. Machine printed, 4-inches by 4-inches (nominal), thermal transfer, high adhesion polyester.
2. Provide UV resistant laminate for outdoor labels.

H. Arc Flash Label Information:

1. Equipment name.
2. Identifier LINE or LOAD where equipment has potential different energy levels.

3. Arc flash hazard information: arc flash boundary and incident energy in cal/cm².
4. Shock hazard information: limited approach and restricted approach boundaries.
5. Personal Protective Equipment (PPE) requirements.
6. Study Supplier, project number, and date.

I. Provide arc flash label sample with preliminary report.

J. Do not pre-print the labels until equipment is energized and protective devices set according to the approved final protective device coordination study.

PART 3 - EXECUTION

3.1 POWER SYSTEM DATA

A. Obtain all data necessary for conduct of the study.

1. Verify completeness of data supplied on one-line diagram. Call any discrepancies to Engineer's attention.
2. For equipment included as Work of this Project, use characteristics submitted under provisions of action submittals and information submittals for this Project.
3. For relocated equipment and that which is existing to remain, obtain required electrical distribution system data by field investigation and surveys conducted by qualified technicians and engineers. Ensure qualifications of technicians and engineers as defined by NFPA 70E.

B. Gather and tabulate the required input data to support the power system study.

C. Field data gathering for existing systems is under the direct supervision and control of the engineer in charge of performing the study and by the engineer or its representative who holds NETA ETT-Certified Technician Level III or NICET Electrical Power Testing Level III certification.

D. Data included, but are not limited to, the following:

1. Product data for overcurrent protective devices and existing settings.
2. Electrical power utility information. Information required may include:

    a. Available minimum and maximum three-phase fault current and X/R ratio.
    b. Available minimum and maximum single-line-to-ground fault current and X/R ratio.
    c. Service transformer voltage, kVA, and impedance ratings, winding configuration, and grounding method.
    d. Upstream protective device data.

3. Power sources and ties.
4. For switchgear, switchboards, panelboards, and motor control centers, ampacity and SCCR in amperes RMS symmetrical.
5. For transformers, kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.

6. For reactors, manufacturer and model designation, voltage rating, and impedance.
7. For circuit breakers, trip units, and fuses, manufacturer and model designation. List type of breaker, type of trip, SCCR, current rating, and breaker settings.
8. For generators, short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
9. For busways, manufacturer and model designation, current rating, impedance, lengths, and conductor material.
10. For motors, horsepower and NEMA MG 1 code letter designation.
11. Conductor sizes, lengths, number, conductor material, shield parameters for medium voltage cable, and conduit material (magnetic or nonmagnetic).
12. For relays, manufacturer and model designation, current transformer ratios, potential transformer ratios, and relay settings.
13. Derating factors.

3.2 FIELD QUALITY CONTROL

A. Do all testing and adjustment prior to the energization of new equipment.

B. Test existing adjustable protective devices in accordance with NETA MTS.

C. Test new adjustable protective devices in accordance with NETA ATS.

D. Adjust existing and new protective devices according to approved coordination study.

E. Ensure testing and adjusting by a full-time employee of the Field Adjusting Agency, who holds NETA ETT-Certified Technician Level III or NICET Electrical Power Testing Level III certification.

F. After successful testing and adjustment, install calibration sticker with Field Adjusting Agency name, employee initials, and date of calibration at each relay or protective device.

G. After energization, minor adjustments to settings may be required to commission the equipment.

H. Submit field report and list any changes made during field adjustment or commissioning for update for record submittal of study.

I. For adjustable breakers, install sticker listing final adjusted settings, i.e. LTPU, LTD, STPU, STD, INST, GFPU, and GFD.

3.3 ARC FLASH LABELING

A. After the field adjustment of relays and protective devices, apply arc flash study labels.

B. Apply arc flash labels on the front covers of the following new equipment:

1. Switchboards, and panelboards.
2. Variable frequency controllers.
3. Disconnect switches.
4. 480V control panels.

5. Circuit breakers.
6. HVAC Equipment.
7. All loads in 120/208V and 120/240V panelboards.

C. Apply arc-flash labels at each section for large equipment such as Switchboard.

D. Install LINE and LOAD arc-flash labels as applicable.

E. Remove any previous arc flash study labels as applicable and install new labels under the direction of the Power System Analysis Specialist.

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SECTION 260800 - COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes procurement of the services of an Electrical Testing Firm Supplier (ETFS) to provide all materials, equipment, labor, and services required to achieve a fully commissioned electrical system.

B. The intent of the Section is to:

1. Provide electrical system construction planning.
2. Provide summary qualifications of the testing firm.
3. Summarize division of responsibility for electrical commissioning.
4. Define additional testing, inspections, and adjustments.

C. The following Division 26 Sections include testing and/or settings requirements:

1. Section 260519 “Low-Voltage Electrical Power Conductors and Cables.”
2. Section 260526 “Grounding and Bonding for Electrical Systems.”
3. Section 260573 "Power System Studies.”

D. Other Divisions include electrical testing requirements for equipment with electrical components. These include:

1. Automation Equipment – Division 40.
2. Fire Alarm, Security and CCTV Equipment – Division 28

E. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 DEFINITIONS

A. Electrical Testing Firm Supplier (ETFS): The firm responsible for providing specialty and independent testing and adjustments of electrical systems on the project..

B. Low Voltage: 600 V and below.

C. Maintenance of Plant Operations (MOPO): A construction plan which prevents or limits process disruptions during construction.

D. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they mean "as-built" systems, assemblies, subsystems, equipment, and components.

1.4 INFORMATIONAL SUBMITTALS

A. Field Quality-Control Reports:

1. Table of contents / Executive summary.
2. Test procedures and equipment used, include calibration dates.
3. Test results that comply with requirements.
4. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
5. Typed test forms, no handwritten entries.

B. Certification that all adjustable circuit breakers have been adjusted to the power system study final approved setting.

C. Certification that arc flash labels that correspond to the final approved power system study have been applied.

1.5 ACTION SUBMITTALS

A. LV Master Project Plan.

1. Submit, within 60 calendar days after Notice to Proceed, the LV Master Project Plan. Plan to include the following:

a. Informational submittal qualification data.
b. Detailed construction phasing for the LV system.
c. Required shutdowns and estimated durations.
d. Temporary power plans for MOPO.

B. Additional LV Project Plans.

1. Submit, no later than 30 calendar days prior to a requested LV system shutdown, a LV Project Plan for upcoming shutdown activities. Plan to include the following:

a. Shutdown and Re-Energization Switching Procedures. Shutdown Procedures will include areas intended to be shutdown, expected duration of shutdown, staffing, safety plans, one-line diagrams showing associated breakers or switches with their status (opened, closed, racked out, temporary grounds) and lockout-tagout locations. Re-Energization Procedures will include same information as Shutdown Procedures, but also phasing and rotation check locations upon re-energization.
b. Failure to submit plan in a timely manner will cause the shutdown to be rescheduled.

C. Switchboard

1. Submit, no later than 30 calendar days prior to first equipment start-up, a plan for operational checks.

D. Power Monitoring / SCADA Verification Plan.

1. Submit, no later than 30 calendar days prior to substantial completion, the list of SCADA points to confirm. Confirmation of actual data (i.e. the breaker is open/closed; amps / volts / kVA readings are correct) is to be done when load is running.

1.6 DIVISION OF RESPONSIBILITY

A. Electrical Contractor Responsibilities Include:

1. Routine insulation-resistance, continuity, and rotation checks prior to and in addition to manufacturer or EFTS testing.
2. Transformer voltage checks and adjustment of taps.
3. Motor rotation and ampacity checks, overload settings, field test reports.
4. Provide suitable and stable source of electrical power required for testing.
5. Coordination and scheduling with Owner, Engineer, Equipment Manufacturers/Suppliers, and ETFS.
6. Obtain the power system study. Engineer must review and approve study prior to placing any new equipment in service.

B. Equipment Manufacturer Responsibilities:

1. Installation checks and testing as listed per individual Section.

C. Additional Testing, Inspections, and Adjustments:

1. Infrared testing of non-modified equipment is not included / required.

D. Section Includes:

1. Electrical equipment connected to Normal electrical systems, including the following:

a. Switchboard transformers.
b. Branch-circuit panelboards.
c. Grounding systems.

2. Controls and instrumentation, including the following:

a. Equipment monitoring systems.
b. Energy monitoring and control systems.
c. Electrical metering and metering system.
d. Demand response systems.
e. Lighting control systems.
f. Security systems.
g. Fire-alarm systems.

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PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL TESTING REQUIREMENTS

A. Field testing and commissioning is intended to follow the latest revisions of NETA Standard ATS, ECS, and MTS as applicable unless otherwise modified in these Sections.

B. Site standard phase rotation is clockwise. That is when phases A, B, C are connected to terminals 1, 2, 3 the phase rotation will be clockwise. If phase rotation must be corrected, it should be done at the end device, i.e. the motor.

C. Where two in-house potential sources are present and may be connected, regardless of the safety interlocks provided, testing to verify correct phasing is required. Without checking this, one source may have clockwise rotation with a 123-ABC and the second source may have a clockwise rotation with a 123-BCA installation. A three-phase short would result if safety interlocks fail and these two sources are connected inadvertently. Hot phase testing is required at all two source locations. This includes the following equipment on this project:

3.2 FIELD QUALITY CONTROL

A. Verify electrical equipment and systems have been tested in compliance with Contract Documents.

B. Provide reports.

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SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Automatic lighting control devices including time control switches, photoelectric switches, lighting contactors, and daylight-harvesting, occupancy and vacancy sensors.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 262726 "Wiring Devices" for wall-box dimmers, non-networkable wall-switch occupancy sensors, and manual light switches.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product used on the project. Note that not all products listed may be utilized on this project.

B. Shop Drawings:

1. Interconnection diagrams showing field-installed wiring.
2. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's warranties.

B. Field quality-control reports.

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PART 2 - PRODUCTS

2.1 PERFORMANCE CRITERIA

A. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

2.2 INDOOR LIGHTING SENSORS

A. Description: Occupancy, vacancy, or daylight sensor used for indoor lighting control. Refer to Drawings for detailed requirements. Catalog numbers listed are provided as a design basis for performance and quality desired. Equivalent design and quality from other manufacturers will be acceptable upon Engineer's approval.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.

B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260533.13 "Conduits for Electrical Systems" for wiring connections and wiring methods.

C. Comply with requirements in Section 260553 "Identification for Electrical Systems" to identify equipment, power sources, wires and cables, and terminals.

D. Adjust timing and aiming of devices to suit Owner operations.

3.3 FIELD QUALITY CONTROL

A. After installing luminaires and lighting control devices, and after electrical circuitry has been energized, confirm correct control operation in all modes.

B. Prepare field quality report certifying verification of correct installation.

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SECTION 262200 - LOW-VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes the following types of low voltage dry-type transformers:

1. Distribution type.

B. Related Requirements:

1. Section 260010 “Supplemental Requirements for Electrical” for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product used on project. Note this Section may include products not required for the project.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type and size of transformer.
2. Include rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, and performance for each type and size of transformer.

B. Shop Drawings:

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of field connections.
2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment.
3. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Field-quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For transformers to include in emergency, operation, and maintenance manuals.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Inspection: On receipt, inspect for and note shipping damage to packaging and transformer.

1. If manufacturer packaging is removed for inspection, and transformer will be stored after inspection, re-package transformer using original or new packaging materials that provide protection equivalent to manufacturer's packaging.

B. Storage: Store in warm, dry, and temperature-stable location in original shipping packaging.

C. Temporary Heating: Apply temporary heat in accordance with manufacturer's published instructions within enclosure of ventilated-type units, throughout periods during which equipment is not energized and when transformer is not in space that is continuously under normal control of temperature and humidity.

D. Handling: Follow manufacturer's instructions for lifting and transporting transformers.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to equipment manufacturer restrictions listed in Section 260010 “Supplemental Requirements for Electrical, transformers from the following manufacturers are approved:

1. Eaton.
2. GE by ABB.
3. Siemens.
4. Square D by Schneider Electric.

B. Source Limitations: Obtain each type of transformer from single source from single manufacturer.

2.2 GENERAL REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

2.3 DISTRIBUTION TRANSFORMERS

A. Comply with the following standards:

1. NEMA ST 20, Dry-Type Transformers for General Applications.
2. UL 1561, Standard for Safety Dry-Type General Purpose and Power Transformers.
3. US Department of Energy Efficiency Standards for Low Voltage Distribution Transformers.

B. General Description:

1. Dry type, two winding. Configuration, kVA, and voltage shown on Drawings.
2. Windings: Copper, unless noted otherwise herein.
3. Temperature Rise: 150 degrees C, unless noted otherwise herein.

C. Taps for transformers 15 kVA and larger: Full capacity, two 2.5 percent above and four 2.5 percent below.

D. Grounding: Provide ground-bar kit or a ground bar installed on the inside of the transformer enclosure.

E. Enclosures:

1. Indoor: NEMA 250, Type 1 gasketed or 2, ventilated. Standard enclosure type.

F. Special Options: Electrostatic shielding, K-13 Rated, harmonic-mitigating, or low sound level rating, where noted on Drawings.

G. Accessories:

1. Wall or ceiling brackets for wall or ceiling mount, where noted on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions for compliance with enclosure- and ambient-temperature requirements for transformers.

B. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's published instructions.

C. Examine walls, floors, roofs, and concrete bases for suitable mounting conditions where transformers will be installed.

D. Verify the grounding electrode system is present and complies with Section 260526 "Grounding and Bonding for Electrical Systems". Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with NECA 1 “Standard for Good Workmanship in Electrical Construction” and NECA 409 “Standard for Installing and Maintaining Dry-Type Transformers.”

B. Comply with manufacturer's published instructions.

C. Install mounting brackets, concrete pads, hangers, and other supports prior to setting transformers in place.

D. Install transformers level and plumb. Install vibration isolators between transformer enclosure and supports in accordance with manufacturer's instructions.

E. Anchor floor mounted transformer to concrete base. Remove shipping braces and adjust internal mounting bolts and hardware in accordance with manufacturer's instructions.

F. Install flexible conduits to minimize vibration transmission.

G. Ground this separately derived system in accordance with Section 260526 "Grounding and Bonding for Electrical Systems." Terminate all grounding and bonding conductors on a common equipment grounding terminal mounted inside the transformer enclosure. Do not allow grounding terminal bar to block ventilation openings.

H. Tighten electrical connectors and terminals in accordance with manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

I. Identify transformers in accordance with Section 260553 "Identification for Electrical Systems."

1. Identify equipment by name designation and fed from source with nameplates.
2. Color code wiring.
3. Identify branch circuit phase and neutral wires by circuit number at TPA.
4. Provide as built type panel directory at TPA.

J. Install Arc Flash Labels in accordance with Section 260573 "Power System Studies".

3.3 FIELD QUALITY CONTROL

A. Perform checkout and testing activities recommended by and in accordance with manufacturer's instructions, NETA ATS, and as specified herein. Correct deficiencies, make adjustments, and retest until requirements are met.

B. Visual and Mechanical Inspection:

1. Compare equipment nameplate data with Drawings and Specifications.
2. Inspect physical and mechanical condition.
3. Inspect anchorage, alignment, and grounding.
4. Verify resilient mounts are free and shipping brackets are removed.
5. Verify unit is clean.
6. Inspect bolted electrical connections for high resistance using one of the following:

    a. A low-resistance ohmmeter.
    b. Calibrated torque wrench.
    c. Thermographic survey.

7. Verify as-left tap connections are as specified.

C. Electrical Tests:

1. Perform insulation-resistance tests for winding-to-winding and winding-to-ground.
2. Verify correct secondary voltage, phase-to-phase and phase-to-neutral, after energization and prior to loading.

D. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of transformer connections.

1. Use an infrared-scanning device designed to measure temperature or detect significant deviations from normal values. Provide documentation of device calibration.
2. Perform follow-up infrared scan of transformers, at 11 months after Substantial Completion.
3. Prepare a certified report identifying transformer checked and describing results of scanning. Include notation of deficiencies detected, remedial action taken, and scanning observations after remedial action.

E. Voltage Recording: Record transformer secondary voltage at each unit under loaded conditions for at least 48 hours of typical occupancy.

1. Submit summary written report.
2. Include the following for each transformer:

a. Designation.
b. Nominal secondary voltage.
c. Existing tap setting.
d. Available tap settings.
e. Steady state maximum secondary voltage recorded.
f. Steady state minimum secondary voltage recorded.
g. Time period duration.
h. Graphical representation of voltage over time period.

3.4 ADJUSTING

A. Adjust tap settings when directed by Engineer.

3.5 CLEANING

A. Remove rubbish and debris from inside and around equipment. Vacuum clean interior.

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SECTION 262413 - SWITCHBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Low voltage, dead front switchboards, components, and accessories.
2. Spares and spaces in equipment as indicated on the Drawings.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260573 “Power System Studies” for short circuit, coordination, and arc flash. The preliminary short circuit study submittal must be approved by the Engineer prior to review of the switchboard submittal.
3. Section 260800 “Commissioning of Electrical Systems” for startup and commissioning of switchboards.
4. Section 264313 “Surge Protective Devices for Low-Voltage Electrical Power Circuits” for features and performance requirements of switchboard manufacturer provided SPDs.

1.3 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include descriptive bill of materials, literature, and catalog cut sheets of components and accessories.
2. Include time-current characteristic curves for overcurrent protective devices. Include selectable ranges for each type of overcurrent protective device.

B. Shop Drawings: For each switchboard.

1. Include drawing index.
2. Include dimensioned plans and elevations, sections, and details, including required clearances and service space around equipment.
3. Indicate shipping sections, and weights of each assembled section. Show major components and features on elevations. Show locations for conduit entrances, anchor bolts, and leveling channels on plans.
4. Include assembly ratings including enclosure type, short circuit, voltage, current, and bus material.
5. Include tabulation of rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
6. Include cable terminal lug sizes.
7. Include wiring and schematic diagrams for power, signal, and control wiring.
8. Include nameplate information.
9. Where applicable, include busway connection details, key interlock schemes, sequence of operations, composite floor plans of close-coupled assemblies, and utility metering compartment details.

C. Installation Instructions: For switchboard and major component assembly.

D. Specification Compliance:

1. Include a copy of this specification confirming compliance with each paragraph. For deviations, provide detailed commentary to explain the deviation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Seismic Qualification Data: Certificates, for switchboards, accessories, and components, from manufacturer.

1. Certificate of compliance.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based, and their installation requirements.

C. Source quality-control reports.

D. Field quality-control reports.

E. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For switchboards and accessories to include in emergency, operation, and maintenance manuals.

1. Include the following:

    a. Routine maintenance requirements for switchboards and installed components.
    b. Manufacturer's instructions for testing and adjusting circuit breaker trip settings.
    c. Time-current curves, including selectable ranges for each type of overcurrent protective device. Include selectable ranges for each type of overcurrent protective device.
    d. "As-Built" shop drawings incorporated during construction by manufacturer or Contractor.
    e. "As-Left" settings for adjustable devices such as timers and overcurrent protective devices.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Potential Transformer Fuses: Equal to 10 percent of quantity installed for each size and type but no fewer than two of each size and type.
2. Control Power Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.
3. Rating Plug and Trip Units: Of each size and type.
4. Indicating Lights (lamp and lens cap): Two of each type and color installed.
5. One dozen each of cover bolts, spring nuts and door fasteners.

B. Touchup paint: half-pint container of paint matching the enclosure exterior finish**.**

C. One single hand-held portable test kit capable of testing each of the circuit breaker microprocessor trip unit functions.

1.8 QUALITY ASSURANCE

A. Testing Agency Qualifications: Accredited by NETA.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with the following for delivery, storage, and handling:

1. Manufacturer's instructions.
2. Section 260010 "Supplementary Requirements for Electrical."
3. NECA 400-2007 "Standard for Installing and Maintaining Switchboards."
4. ANSI/NEMA PB 2.1-2011 "General Instructions for Proper Handling, Installation, Operation, and Maintenance of Deadfront Distribution Switchboards Rated 1000 Volts or Less."

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace switchboards and accessories that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to equipment manufacturer restrictions listed in Section 260010 “Supplemental Requirements for Electrical,” switchboards from the following manufacturers are approved:

1. ABB.
2. Eaton.
3. Schneider Electric / Square D.
4. Siemens.

B. Source Limitations: Obtain switchboards from single source from single manufacturer.

C. Modifications or Additions to Existing Switchboards: Use original manufacturer for model series still in production; otherwise use original manufacturer or approved manufacturer with documented prior experience providing similar types of modifications.

2.2 GENERAL REQUIREMENTS

A. Low voltage switchboard assembly, free-standing, dead-front type, ANSI / NEMA rated, and UL 891 labeled for installation on low voltage electrical distribution system indicated on Drawings. General arrangement, alignment, ratings, and major components of switchboards are shown on the Drawings.

B. Fully rate main and feeder circuit breakers for the specified short circuit duty. Systems employing series ratings are unacceptable.

C. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

D. Comply with the following standards as applicable:

1. NEMA PB 2-2011, Deadfront Distribution Switchboards.
2. UL 489, Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.
3. UL 891, Switchboards, CCN WEVZ.
4. UL 1066, Power Circuit Breakers up to 1000 V AC and 1500 V DC Used in Enclosures.
5. UL 1449, Surge Protective Devices.

E. Product Selection for Restricted Space: Drawings indicate maximum dimensions for switchboards including clearances between switchboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

F. Temperature: Design switchboards and devices for continuous operation at rated current with a 40 degrees Celsius (104 degrees Fahrenheit) ambient temperature.

2.3 SYSTEM DESCRIPTION

A. SWBD OB:

1. Front access only, front and rear aligned, with individual sections for main breaker. Group mounted feeder sections. Eaton Pow-R-Line Xpert or equivalent.

2.4 CONSTRUCTION

A. Construct switchboard with required number of vertical sections bolted together to form a rigid assembly. Cover sides and rear with removable bolt-on covers. Form edges of front covers or hinged front panels. Provide adequate ventilation.

B. Align sections of switchboard as indicated on Drawings.

C. Provide switchboard assembly with adequate lifting means.

D. Indoor Enclosure: NEMA Type 1 enclosure unless otherwise indicated on drawings.

E. Maximum Dimensions: As indicated on drawings. Comply with NEC height limit of operating handles when switchboard is installed on 4-inch-high housekeeping pad.

F. Exterior Enclosure Finish: Factory-applied finish in manufacturer's standard color over a rust-inhibiting primer on treated metal surface.

G. Interior Enclosure Finishes:

1. Control and power cell compartment: high gloss white for easier visibility.
2. Unpainted steel parts, plated for corrosion resistance.

H. Barriers: Between adjacent switchboard sections.

I. Hinged Front Panels: Allow access to circuit breaker, metering, accessory, and blank compartments. Use captive quarter turn fasteners.

J. When wires or buswork passes through holes or sections, add suitable guarding or grommets for close fit and to prevent cutting or chafing of insulation.

K. Where Drawings indicate space for future overcurrent protective devices, equip space with so only the overcurrent protective device is needed to be added. Include buswork, barriers, connections, protective device mounting hardware, doors/covers, etc. required.

L. Bus Systems:

1. Phase Bus Arrangement: A, B, C from front to back, top to bottom, and left to right when viewed from front of switchboard.
2. Phase and Neutral Bus: Tin plated copper, bolted joints, fully rated throughout the lineup. Tapered bus is not allowed. Braced for 65,000 A rms unless otherwise noted on Drawings. Full size neutral bus for four wire systems if indicated on Drawings.
3. Ground Bus: Minimum 1/4-inch by 2-inch, tin plated copper uninsulated ground bus, extended through each section.
4. Disconnect Links: Isolate neutral bus from incoming neutral conductors. Bond neutral bus to equipment ground bus for switchboards utilized as service equipment or separately derived systems.

M. Wiring/Terminations:

1. Instrument and Control Wire: Stranded copper, type SIS, bundled and secured with nylon ties. Minimum size No. 14 AWG.
2. Control Wire Terminations: Insulated locking spade terminals, except where saddle type terminals are provided integral to device. Current transformer secondary leads must connect to shorting type terminal blocks before connecting to another device.
3. Provide numbered terminal blocks for landing control wiring that leaves the switchboard.
4. Power Terminations: Mechanical type, suitable for 75 or 90 degrees Celcius depending on ampacity rating for conductor, copper cable of the size indicated on Drawings.

2.5 CIRCUIT BREAKERS

A. Circuit breakers 800 A frame and larger: 600 V, insulated-case type, listed and labeled to UL 489, 100 percent continuous ampacity, fixed mount, electrically operated. Temperature insensitive, true RMS, integral, fully adjustable solid state electronic trip unit with the following features:

1. Independently adjustable long-time pick-up and delay.
2. Independently adjustable short-time pick-up, delay, and I^2t settings.
3. Adjustable instantaneous pick-up.
4. Independently adjustable ground fault pick-up, delay and I^2t settings.
5. Trip mode targets for overload, short circuit and ground fault.
6. Long-time pick-up light.
7. Ammeter readout for each phase.

B. Circuit breakers 225 A frame and less: 600 V, molded-case type, listed and labeled to UL 489, 80 percent continuous ampacity rated. Thermal magnetic trip.

2.6 IDENTIFICATION

A. Signs and Nameplates: Engraved, laminated plastic, stainless steel screw attachment, background color and letters as noted herein.

B. Master Nameplate: Switchboard designation, service ratings, factory order number, and date (month/year) of manufacture. Lettering not less than 3/8-inch high, black background, white letters. Locate at top of switchboard section containing incoming feed.

C. Unit Compartment or Breaker Nameplates: Designation as indicated on drawings. Lettering not less than 3/8-inch high, black background, white letters.

D. Identify pilot devices and operators using legend plates or nameplates.

E. Identify internal components, corresponding to wiring diagrams.

F. Include warning labels on terminals that are energized with the power disconnect OFF.

G. Control Wire Identification: Typed sleeve type labels at each end, corresponding to wiring diagrams. Wiring less than six inches may be numbered at only one end. Identify foreign voltage control wiring with yellow wires.

2.7 SURGE PROTECTION

A. Integral Surge Protective Device: To protect input AC line from transients.

1. By switchboard manufacturer, factory installed, with integral disconnect.
2. Type 2.
3. SCCR: Equal to SCCR of switchboard.
4. Performance and Features: Comply with Section 264313 “Surge Protection for Low-Voltage Electrical Power Circuits.”

2.8 INSTRUMENTATION AND METERING

A. Current Transformers: 600 V, 5 A secondary, bar type, single secondary winding and secondary shorting device and in compliance with IEEE C57.13-2016. Ensure burden and accuracy is consistent with connected metering and relay devices.

B. Digital Metering (Power Monitors): By switchboard manufacturer, factory installed and integrated. Schneider Electric PowerLogic PM8000 Series or equal for immediate level of metering and power quality analysis including waveform capture. Locate top of power quality meter cubicle at 60-inches from bottom of switchboard, plus or minus 6-inches.

2.9 SOURCE QUALITY CONTROL

A. Test and inspect equipment according to UL, NEMA, and manufacturer.

B. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Upon delivery of switchboard and prior to unloading, inspect equipment for damage.

B. Examine areas and surfaces to receive switchboard, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of the Work.

C. Verify that ground connections are in place and that requirements in Section 260526 "Grounding and Bonding for Electrical Systems" have been met.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation: Unless more stringent installation requirements are specified in Contract Documents or manufacturer's published instructions, comply with the following:

1. NECA NEIS 400-2007 – Standard for Installing and Maintaining Switchboards.
2. NEMA PB 2.1-2011 – General Instructions for Proper Handling, Installation, Operation, and Maintenance of Deadfront Distribution Switchboards Rated 1000 Volts or Less.

C. Provide equipment housekeeping pads as detailed on the Drawings.

D. Bolt switchboard floor sills directly to finished floor or equipment pad. Make structure level, plumb, and secure. Use 1/2-inch (minimum) anchor bolts. Provide necessary hardware and shims.

E. Remove temporary lifting angles, lugs, and shipping braces. Touch up damaged paint finishes.

F. When conduits enter the top of the switchboard, enter the corresponding section. Do not enter the switchboard from the side unless approved in writing by the Engineer.

G. Grounding and Bonding:

1. Bond equipment ground bus to grounding electrode system as shown on Drawings.
2. Bond all conduits including stub-ups to the equipment ground bus.

H. Install conduits to prevent water from entering enclosure. Seal voids around conduit stub-ups.

I. Neatly group field installed interior wiring by circuit using plastic tie wraps. Support circuit groups to avoid stress at terminations.

J. Make wiring interconnections between shipping splits. Install bus splice plates.

K. Tighten bolted connections and wiring connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.

L. Obtain the manufacturer's services for the commissioning and startup work.

3.3 IDENTIFICATION

A. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

1. Identify equipment by name designation and fed from source nameplates.
2. Identify field-installed conductors, interconnecting wiring, and components.

B. Install Arc Flash Labels in accordance with Section 260573 "Power System Studies."

3.4 FIELD QUALITY CONTROL

A. Division of Responsibilities:

1. Provide installation and assist with all testing and startup activities.
2. Engage factory authorized service representative to assist in installation, inspection, testing, startup, and commissioning activities specified herein to active manufacturer's warranty.
3. Engage a qualified testing agency as defined in this Section to perform activities defined in Section 260800 "Commissioning of Electrical Systems".

B. General Requirements:

1. Perform inspection, testing, and startup activities recommended by and in accordance with manufacturer's instructions, NETA ATS, and as specified herein.
2. Perform testing and test methods in compliance with NFPA 70B.
3. Optional NETA ATS tests are not required unless specifically called for in this specification or the manufacturer's instructions.
4. Provide materials and labor as necessary.
5. Correct deficiencies, adjust, and retest until requirements are met.
6. Provide written report for each field testing or service visit.

C. Visual and Mechanical Inspection:

1. Confirm equipment and devices conform to approved shop drawings.
2. Inspect physical and mechanical condition.
3. Inspect anchorage, alignment, and grounding. Adjust compartment doors as required.
4. Verify tightness of accessible bolted electrical connections. Use calibrated torque wrench.
5. Verify unit is clean.
6. Verify smooth and correct operation of mechanical devices: circuit breakers, interlocks, etc.

D. Electrical Tests:

1. Insulation resistance test of bus, phase to phase and phase to ground after disconnecting devices sensitive to test voltage.
2. Check polarity and continuity of metering and relaying circuits.
3. Test ground connections for continuity and resistance.
4. Test protective devices and equipment as recommended by manufacturer.
5. Verify correct input and output voltages, currents, and phase rotations.

E. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switchboard.

1. Use an infrared-scanning device designed to measure temperature or detect significant deviations from normal values. Provide documentation of device calibration.

F. Switchboards will be considered defective if they do not pass tests and inspections.

3.5 STARTUP AND COMMISSIONING SERVICE

A. Adjust protective devices in accordance with the final approved submittal of Section 260573 “Power System Studies.”

3.6 DEMONSTRATION AND TRAINING

A. Engage a factory-authorized service representative to demonstrate correct operation, adjust settings, and maintain switchboards to Owner.

B. Provide 8-hour man day for instruction. Time instruction to cover all working shifts.

3.7 CLEANING

A. Remove rubbish and debris from inside and around the equipment. Remove dirt, dust, or concrete spatter from the interior and exterior of the equipment using brushes, vacuum cleaner, or clean, lint-free rags. Do not use compressed air.

END OF SECTION 262413

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SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Lighting and appliance branch circuit panelboards.
2. Circuit breakers.
3. Accessories and special construction.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 264313 “Surge Protection for Low-Voltage Electrical Power Circuits” for performance requirements of factory installed SPDs.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product used on project. Note this Section may include products not required for the project.

1. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
2. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details.
2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
4. Detail bus configuration, current, and voltage ratings.
5. Short-circuit current rating of panelboards and overcurrent protective devices.
6. Include evidence of listing, by qualified electrical testing laboratory recognized by authorities having jurisdiction, for SPD as installed in panelboard.

7. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
8. Include wiring diagrams for power, signal, and control wiring.
9. Key interlock scheme drawing and sequence of operations.
10. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Include Internet link for electronic access to downloadable PDF of coordination curves.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. Include the following:

1. Manufacturer’s written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

B. Warranty documentation.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace switchboards and accessories that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to equipment manufacturer restrictions listed in Section 260010 “Supplemental Requirements for Electrical.” panelboards from the following manufacturers are approved:

1. Eaton.
2. ABB.
3. Siemens.
4. Schneider Electric / Square D.

B. Source Limitations:

1. Obtain new panelboards from single source from single manufacturer.
2. Obtain retrofit disconnecting and overcurrent protective devices from existing panelboard manufacturer or subsequent responsible manufacturer, to maintain overall UL listing of panelboard.

2.2 GENERAL REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing agency recognized by authorities having jurisdiction and marked for intended location and application.

B. Comply with the following standards as applicable:

1. NEMA PB 1-2011, Panelboards.
2. UL 50, Enclosures for Electrical Equipment, Non-Environmental Considerations.
3. UL 50E, Enclosures for Electrical Equipment, Environmental Considerations.
4. UL 67, Standard for Panelboards, CCN QEUY.
5. UL 489, Standard for Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.
6. UL 1449, Surge Protective Devices.

C. Ratings:

1. Ratings are indicated on the Drawings.
2. Series rated panelboards are prohibited. Circuit breakers must be fully rated for the short circuit rating listed for the panelboard.

D. Construction:

1. NEMA 1 gasketed enclosure, unless noted otherwise on Drawings. Equipment grounding bars are ordered as an accessory as they are not required by NEC. NEC allows metal conduits to act as equipment grounding conductors. CDM Smith designs always require green wire grounds for equipment grounding conductors. Green wire grounds should never be landed on the same terminal bar as neutrals.
2. Copper equipment grounding bar, separate and distinct from neutral bar.
3. Conductor Lugs:

    a. Mechanical type.
    b. Size suitable for indicated conductor sizes.
    c. Neutral (when present) and ground lug quantity equal to each pole in panelboard.

4. Where Drawings indicate space for future circuit breaker, equip panelboard with bus bars, blank covers, and mounting hardware so only the future breaker need be provided.

E. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearance between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

2.3 LIGHTING AND APPLIANCE BRANCH CIRCUIT PANELBOARDS

A. Manufacturer's lighting and appliance panelboard using molded-case bolt-on circuit breakers.

B. Doors: Door-in-door construction with concealed hinges; secured with flush keyed lock and catch, except doors over 48 inches in height to use a vault-type latch with tumbler lock and 3-point catch. All locks keyed alike.

C. Bus: Tin-plated copper.

2.4 CIRCUIT BREAKERS

A. Molded case, manufactured by panelboard manufacturer.

B. Plug-in or bolt-on as listed in associated panelboard Article.

C. Configuration, frame size, trip, and special features such as GFCI (Class A trip, 4-6 mA) or GFI (Class B trip, 30 mA) as shown on Drawings.

D. Provide breaker lugs to accommodate wire sizes shown on Drawings.

E. Multi-pole breakers to have common trip. Do not convert single pole breakers to multi-pole using handle ties, use multi-pole breaker.

F. Thermal-Magnetic Circuit Breakers:

1. Inverse time-current element for low-level overloads.
2. Instantaneous magnetic trip element for short circuits.
3. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2.5 ACCESSORIES AND SPECIAL CONSTRUCTION

A. Accessories such as breaker lockout devices or key interlocks are indicated on the Drawings.

B. Electronic Grade:

1. Neutrals: 200 percent rated.

C. NEMA 3R or 12 Enclosure:

1. Material: galvanized steel.

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PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.

B. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.

C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation: Unless more stringent requirements are specified in Contract Documents or manufacturer's published instructions, comply with the following:

1. ANSI/NEMA PB 1.1-2023 – General Instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less.
2. NECA NEIS 407-2015 – Standard for Installing and Maintaining Panelboards.

C. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

D. Equipment Mounting:

1. Attach panelboard to the vertical finished or structural surface behind panelboard.
2. Mount back box plumb and level, and surface or flush mount as indicated on Drawings.
3. Mount surface-mounted panelboards to supports to allow a minimum of 1/2 inch air space between the box and the mounting surface.
4. Mount flush-mounted panelboards with front cover uniformly flush with wall finish and mating with back box.
5. Mount top of trim 72 inches above finished floor unless otherwise indicated.

E. Install circuit breakers not already factory installed. Rearrange circuit breakers to correspond to panel schedules shown on Drawings.

F. Tighten bolted connections and wiring connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.

G. Install filler plates in unused spaces.

H. Plug abandoned or unused entry holes.

I. Do not leave cut off wires at breakers, neutral bar terminal, or ground bar terminal.

J. Identify panelboards in accordance with Section 260553 “Identification for Electrical Systems.”

1. Identify equipment by name designation and fed from source nameplates.
2. Identify pole numbers.
3. Color code wiring.
4. Identify branch circuit phase and neutral wires by circuit number.
5. Provide as built typed panelboard directory.

K. Adjust circuit breakers with adjustable trips in accordance with the final approved submittal of Section 260573 “Power System Studies.”

L. Install Arc Flash Labels in accordance with Section 260573 “Power System Studies.”

3.3 FIELD QUALITY CONTROL

A. Perform checkout and testing activities recommended by and in accordance with manufacturer’s instructions, NECA 407, and as specified herein. Correct deficiencies, make adjustments, and retest until requirements are met.

B. Visual and Mechanical Inspection:

1. Compare equipment nameplate data with Drawings and Specifications.
2. Inspect physical and mechanical condition.
3. Inspect anchorage, alignment, and grounding.
4. Verify unit is clean.
5. Verify breakers operate smoothly.

C. Electrical Tests:

1. Perform insulation resistance test on buswork in accordance with manufacturer’s instructions.
2. Verify correct voltage and phasing at each panelboard.
3. Verify load currents are balanced across the three phases.

D. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of panelboard connections for new or modified panelboards.

1. Use an infrared-scanning device designed to measure temperature or detect significant deviations from normal values. Provide documentation of device calibration.
2. Prepare a certified report identifying panelboard checked and describing results of scanning. Include a notation of deficiencies detected, remedial action taken, and scanning observations after remedial action.

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3.4 CLEANING

A. Remove rubbish and debris from inside and around equipment. Vacuum clean interior.

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SECTION 262716 - ELECTRICAL CABINETS AND ENCLOSURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes electrical cabinets, enclosures, and accessories for low voltage electrical systems not specified elsewhere.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of cabinet or enclosure. Include accessories.

B. Shop Drawings: For custom enclosures and cabinets.

PART 2 - PRODUCTS

2.1 GENERAL REQUIRMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2.2 TERMINATION BOXES (TERMINAL CABINETS)

A. Description: Factory assembled, wall-mount industrial enclosure with hinged cover. Internal back plate with mounted terminal blocks. Size and additional detail per the Drawings.

B. NEMA 1 or NEMA 12 Termination Boxes:

1. Material: Sheet steel, minimum 14 gauge, without knockouts.
2. Construction: Flanged box, galvanized with continuous weld seams that are ground smooth.

3. Cover: Gasketed, hinged, vault type handle, three-point latch and keyed lock.

C. NEMA 4X Termination Boxes:

1. Material: Type 316 stainless steel, minimum 14 gauge, without knockouts.
2. Construction: Flanged box, galvanized with continuous weld seams that are ground smooth.
3. Cover: Gasketed, hinged, vault type handle, three-point latch and keyed lock.

D. Provide individual terminals for shield/drain wire of instrumentation cable, i.e. each twisted shielded pair cable will have three terminals.

E. Provide a minimum of 50 spare terminals.

F. Identification:

1. Identify cabinet with nameplate, 3/8-inch-high letters, black letters on white background.
2. Identify each termination point on terminal blocks using type written labels.
3. Provide type written terminal block schedule for each cabinet.

PART 3 - EXECUTION

3.1 PREPARATION

A. Shop Drawings: Prepare and submit the following:

1. Shop Drawings for Custom Enclosures and Cabinets: Include plans, elevations, sections, and attachment details.
2. Shop Drawings for Racks or Frames:

a. Include plans, elevations, sections, details, and attachments to other work.
b. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
c. Include workspace requirements and access for cable connections.
d. Grounding: Indicate location of RBB and its mounting detail showing standoff insulators and wall-mounting brackets.

3.2 SELECTION OF ELECTRICAL CABINETS AND ENCLOSURES

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for selection of electrical cabinets and enclosures. Consult Architect for resolution of conflicting requirements.

B. Degree of Protection:

1. Outdoors:

a. Type 4X unless otherwise indicated.

2. Indoors:

    a. Type 1 gasketed unless otherwise indicated.
    b. Damp or Dusty Locations: Type 12.
    c. Surface Mounted in Kitchens and Other Locations Exposed to Oil or Coolants: Type 12.
    d. Flush Mounted in Kitchens and Other Locations Exposed to Oil or Coolants: Type 12.
    e. Locations Exposed to Corrosive Agents: Type 4X.

3.3 INSTALLATION OF ELECTRICAL CABINETS AND ENCLOSURES

A. Comply with manufacturer's published instructions.

1. Cabinets and Cutout Boxes: Article 312 of NFPA 70.

B. Special Installation Techniques:

1. Mount cabinets and enclosures at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements.
2. Do not install cabinets, enclosures, or fittings in contact with concrete or earth.
3. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to ensure a continuous ground path.
4. Identification: Install labels and nameplates in accordance with Section 260553 “Identification for Electrical Systems.”

    a. Identify field-installed conductors, interconnecting wiring, and components.
    b. Identify cabinets and enclosures with nameplates as indicated on Drawings.
    c. Provide as built typed terminal cabinet schedules.
    d. Label each cabinet, enclosure, and rack with engraved metal or laminated-plastic nameplate.

C. Interfaces with Other Work:

1. Coordinate installation of new products with existing conditions.

3.4 CLEANING

A. Remove construction dust and debris from cabinets and enclosures.

3.5 PROTECTION

A. After installation, protect cabinets and enclosures from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use protect to acceptance by Owner.

B. Protect coatings and finishes of cabinets and enclosures from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 262716

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SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes receptacles, toggle switches, cover plates, and cord and plug sets.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260923 “Lighting Control Devices” for occupancy sensors, timers, control-voltage switches, and control voltage dimmers

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product used on project. Note this Section may include products not required for the project.

B. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Items: Furnish extra materials to Owner that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Comply with NFPA 70.

C. RoHS compliant.

D. Comply with the following standards and UL Category Control Number (CCN) listing criteria as applicable:

1. UL 20, Standard for General-Use Snap Switches, CCN WMUZ.
2. UL 498, Standard for Attachment Plugs and Receptacles, CCN RTRT.
3. UL 943, Standard for Ground-Fault Circuit-Interrupters (Class A), CCN KCXS.
4. ANSI/NEMA WD 6 for dimensional requirements for receptacles and plugs rated up to 60A and 600V.
5. NEMA WD 1 for colors.
6. Federal Specifications:

    a. FS W-S-896 for switches.
    b. FS W-C-596 for receptacles.

E. Device Color:

1. White: Devices located in administrative office areas, conference rooms, break rooms, restrooms, and control rooms.
2. Gray: Devices located in electrical rooms, mechanical rooms, process areas, and outdoors.

F. Wall Plate Color: For non-metallic covers, match device color.

G. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 INDUSTRIAL SPECIFICATION GRADE RECEPTACLES, 125V, 20A

A. Duplex Receptacles, 125V, 20A

1. Manufacturers or equal:

    a. Arrow-Hart (Eaton), 5362 Series.
    b. Hubbell, 5362 Series.
    c. Leviton, 5362 Series.

2. Description: Heavy duty, industrial, specification grade, two-pole, three-wire, and self-grounding, NEMA 5-20R.

B. Duplex Weather-Resistant Receptacles, 120V, 20A. Drawing Designation: WP.

1. Hubbell, HBL5362WR Series or equal.
2. Description: Heavy duty, industrial, specification grade, weather-resistant, two-pole, three-wire, and self-grounding, NEMA 5-20R.

C. Duplex GFCI Receptacles, 125V, 20A. Drawing Designations GFCI.

1. Manufacturers or equal:

a. Hubbell GF5362SG Series.
b. Arrow-Hart (Eaton) TWRSGF20 Series.
c. Leviton GFTR2-3L Series.

2. Description: Extra heavy duty, industrial, specification grade, tamper-resistant, weather resistant, ground-fault circuit-interrupter receptacle, two-pole, three-wire, and self-grounding, NEMA 5-20R. Integral GFCI with “Test” and “Reset” buttons. Three LED indicators: power solid green, GF/trip solid red, ending of life flashing red.

2.3 INDUSTRIAL SPECIFICATION GRADE TOGGLE SWITCHES, 120/277V, 20A

A. Manufacturers as listed below or equal.

1. Arrow-Hart (Eaton), 1220 Series.
2. Hubbell, HBL1220 Series.
3. Leviton, 1220 Series.

B. Description: Extra heavy duty, industrial, specification grade, switch, 120/277V, 20A, toggle action, flush mounting, quiet type. Single pole, double pole, three-way, or four-way, as indicated on Drawings.

2.4 WALL PLATES

A. Match gang configuration as indicated on Drawings.

B. Obtain wall plates from same manufacturer as wiring device.

C. Plate-Securing Screws: Metal with head color to match plate finish.

D. Material for administrative offices, conference rooms, break rooms, chemistry lab, restrooms, and control rooms: Smooth, high impact thermoplastic or nylon.

E. Material for flush mounted devices in electrical rooms, mechanical rooms, and indoor process areas: Type 302 (18-8) high nickel stainless steel.

F. Material for surface mounted device plates: Same material as box.

G. WP Receptacle Cover Plates: In-use weather-resistant, heavy duty die-cast aluminum and UV-resistant polycarbonate with lockable cover.

H. WP Switch Cover Plates: Weatherproof switch cover, listed to UL514D, non-metallic UV-resistant, operable without opening cover, lockable. Arrow-Hart (Eaton) S2983 or equal.

2.5 CORD AND PLUG SETS

A. Match voltage and current ratings and number of conductors to requirements of equipment being connected.

B. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.

C. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install devices in accordance with NFPA 70, manufacturer's instructions, and listing for each device.

B. Install switch and receptacle outlets flush with finished wall for new wall construction and where existing wall is stud and sheetrock construction.

C. Drawings show the general location of devices unless dimensioned. Adjust and coordinate location to avoid piping or other obstructions.

D. Use of one GFCI receptacle to protect downstream conventional receptacles is prohibited.

E. Device Mounting Heights (as measured to the center of the device box):

1. Switches and occupancy sensors: 48 inches AFF, located on strike side of door.
2. Wall receptacles, unless otherwise noted on Drawings:

    a. Process areas and shops: 36 inches AFF.
    b. Administration office areas: 18 inches AFF.
    c. Corridors and hallways: 18 inches AFF.
    d. Electrical and mechanical rooms: 18 inches AFF.
    e. Restrooms: 18 inches AFF.
    f. Above counters: 8 inches above countertop or at backsplash level.
    g. Exterior walls: 24 inches AFG.

3. Where walls are unplastered brick or masonry, adjust mounting height above so one horizontal edge of device box lines up with a horizontal joint in the masonry.

F. Device Boxes:

1. Install correct size and type box for the device(s) and location, allowing for adequate space for conductors, connectors, clamps, devices, and barriers, where required.

2. Install boxes level, plumb, and secure. Do not install boxes back-to-back in walls.

G. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes, and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install wiring devices after all wall preparation, including painting, is complete.

H. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. Provide adequate length of free conductors at boxes for devices without pigtails. Pigtailing existing conductors is permitted, provided the box is large enough.

I. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Make equipment grounding conductor connections and splices so removal or disconnection of any wiring devices does not interrupt continuity of the branch circuit equipment grounding conductor.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw. Do not overlap conductors.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. Tighten unused terminal screws on the device.
8. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

J. Orientation and Arrangement:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the right.
2. Group adjacent switches under single, multi-gang wall plates.

K. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

3.2 IDENTIFICATION

A. Label receptacles and switches with panelboard identification and circuit number in accordance with Section 260553 "Identification for Electrical Systems."

B. Label receptacles that are non-GFCI type but GFCI protected, such as from a GFCI circuit breaker, with a label “GFCI Protected.”

3.3 FIELD QUALITY CONTROL

A. Verify correct operation of GFCI receptacles using GFCI tester.

B. Verify correct voltage and phasing at receptacles.

1. Use receptacle circuit tester for NEMA 5-20R receptacles. Use voltmeter for other receptacles.
2. Use phase sequence meter for three phase receptacles.

C. Correct deficiencies found and reverify.

D. Prepare field quality report certifying verification of correct installation.

END OF SECTION 262726

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SECTION 262813 - FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cartridge fuses rated 600 V ac and less for use in the following:

a. Control circuits.
b. Panelboards.
c. Switchboards.
d. Enclosed controllers.
e. Enclosed switches.

B. Related Requirements:

1. Section 260010 “Supplemental Requirements for Electrical” for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include construction details, material descriptions, dimensions of individual components and profiles and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:

1. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.

a. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
b. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.

2. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
3. Current-limitation curves for fuses with current-limiting characteristics.
4. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse. Submit in PDF format.

5. Coordination charts and tables and related data.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals include the following:

1. Ambient temperature adjustment information.
2. Current-limitation curves for fuses with current-limiting characteristics.
3. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse used on the Project. Submit in PDF format.
4. Coordination charts and tables and related data.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

1.6 FIELD CONDITIONS

A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply manufacturer's ambient temperature adjustment factors to fuse ratings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Bussmann; Eaton, Electrical Sector.
2. Littelfuse, Inc.
3. Mersen USA.

B. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, current-limiting, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

1. Type RK-1: 600-V, zero- to 600-A rating, 200 kAIC, time delay.
2. Type RK-5: 600-V, zero- to 600-A rating, 200 kAIC, time delay.
3. Type CC: 600-V, zero- to 30-A rating, 200 kAIC, time delay.
4. Type CD: 600-V, 31- to 60-A rating, 200 kAIC, time delay.
5. Type J: 600-V, zero- to 600-A rating, 200 kAIC, time delay.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NEMA FU 1 for cartridge fuses.

D. Comply with NFPA 70.

E. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.

B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.

C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

A. Cartridge Fuses:

1. Feeders: Class RK1, time delay, Class RK5, time delay, and Class J, time delay.
2. Motor Branch Circuits: Class RK1, time delay and Class RK5, time delay, time delay.
3. Power Electronics Circuits: Class J, high speed.
4. Other Branch Circuits: Class RK1, time delay, Class RK5, time delay, and Class J, time delay.
5. Control Transformer Circuits: Class CC, time delay, control transformer duty.
6. Provide open-fuse indicator fuses or fuse covers with open fuse indication.

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3.3 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.4 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems" and indicating fuse replacement information inside of door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 262813

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SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Nonfusible switches.
2. Molded-case circuit breakers (MCCBs).
3. Enclosures.

B. Related Requirements:

1. Section 260010 “Supplemental Requirements for Electrical” for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

C. SPDT: Single pole, double throw.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
5. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

B. Shop Drawings: For enclosed switches and circuit breakers.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include wiring diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Seismic Qualification Data: Certificates, for enclosed switches and circuit breakers, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals.

1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
2. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
2. Fuse Pullers: Two for each size and type.

1.8 QUALITY ASSURANCE

A. Testing Agency Qualifications: Accredited by NETA.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than 18 deg F and not exceeding 122 deg F.
2. Altitude: Not exceeding 3000 feet.

1.10 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Ensure enclosed switches and circuit breakers withstand the effects of earthquake motions determined according to ASCE/SEI 7 and Section 260548 "Vibration and Seismic Controls for Electrical Systems."

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.2 GENERAL REQUIREMENTS

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by UL or a NRTL if approved by the Owner and/or Engineer and marked for intended location and application.

D. Comply with NFPA 70.

2.3 NONFUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB, Electrification Business.
2. Eaton.
3. Siemens Industry, Inc., Energy Management Division.
4. Square D; Schneider Electric USA.
5. Or equal.

B. Type GD, General Duty, Three Pole, Single Throw, 240-V ac, 600 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

C. Type HD, Heavy Duty, Three Pole, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

D. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper ground conductors.
2. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 120 V AC.
3. Hookstick Handle: Allows use of a hookstick to operate the handle.
4. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.4 MOLDED-CASE CIRCUIT BREAKERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. ABB Electrification Installations Products.
2. Eaton.
3. Siemens Industry, Inc., Energy Management Division.
4. Square D; Schneider Electric USA.

B. Provide circuit breakers constructed using glass-reinforced insulating material. Ensure current carrying components are completely isolated from the handle and the accessory mounting area.

C. Verify circuit breakers have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. Verify the circuit-breaker handle is over center, trip free, and resides in a tripped position between on and off to provide local trip indication. Clearly marked circuit-breaker escutcheon on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes.

D. Mark the maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems, and corresponding interrupting ratings on face of circuit breaker. Ensure circuit breakers are 100 percent rated. Verify fuse/circuit breaker combinations for series connected interrupting ratings listed by UL as recognized component combinations. Mark any series rated combination used on the end-use equipment along with the statement "Caution - Series Rated System."

E. Equip MCCBs with a device for locking in the isolated position.

F. Ensure lugs are suitable for 194 deg F rated wire, sized according to the 167 deg F temperature rating in NFPA 70.

G. Standard: Comply with UL 489 with interrupting capacity to comply with available fault currents.

H. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

1. Instantaneous trip.
2. Long- and short-time pickup levels.
3. Long- and short-time time adjustments.

I. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

J. Ground-Fault Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (5-mA trip).

K. Ground-Fault Equipment-Protection (GFEP) Circuit Breakers: With Class B ground-fault protection (30-mA trip).

L. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
4. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
5. Communication Capability: Universal-mounted communication module with functions and features compatible with power monitoring and control system, specified in Section 260913 "Electrical Power Monitoring and Control."
6. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
7. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
8. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
9. Alarm Switch: One NO contact that operates only when circuit breaker has tripped.
10. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; removable key only when circuit breaker is in off position.
11. Zone-Selective Interlocking: Integral with ground-fault trip unit; for interlocking ground-fault protection function.
12. Electrical Operator: Provide remote control for on, off, and reset operations.

2.5 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

B. Enclosure Finish: Finish the enclosure with gray baked enamel paint or Owner approved color and paint, electrodeposited on cleaned, phosphatized steel (NEMA 250 Type 1) gray baked enamel paint or Owner approved color and paint, electrodeposited on cleaned, phosphatized galvannealed steel (NEMA 250 Types 3R, 12) a brush finish on Type 304 stainless steel (NEMA 250 Type 4-4X 316 stainless steel or fiberglass if approved by Owner and Engineer).

C. Conduit Entry: NEMA 250 Types 4, 4X, and 12 verify enclosures contain no knockouts. NEMA 250.

D. Operating Mechanism: Ensure the circuit-breaker operating handle is externally operable with the operating mechanism being an integral part of the box, not the cover. Verify the cover interlock mechanism has an externally operated override. Ensure the override does not permanently disable the interlock mechanism, which returns to the locked position once the override is released. The tool used to override the cover interlock mechanism is not required to enter the enclosure in order to override the interlock.

E. Ensure enclosures designated as NEMA 250 Type 4, 4X 316 stainless steel, 12, or 12K have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and to prevent turning the circuit breaker ON when the enclosure cover is open.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Commencement of work indicates Installer's acceptance of the areas and conditions as satisfactory.

3.2 PREPARATION

A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Engineer and Owner no fewer than seven days in advance of proposed interruption of electric service.
2. Indicate method of providing temporary electric service.
3. Do not proceed with interruption of electric service without Engineer's and Owner's written permission.

4. Comply with NFPA 70E.

3.3 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1 gasketed.
2. Outdoor Locations: NEMA 250, Type 4X.
3. Kitchen and Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

3.4 INSTALLATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

C. Comply with mounting and anchoring requirements specified in Section 260548 "Vibration and Seismic Controls for Electrical Systems."

D. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

E. Install fuses in fusible devices.

F. Comply with NFPA 70 and NECA 1.

3.5 IDENTIFICATION

A. Comply with requirements in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections with the assistance of a factory-authorized service representative.

D. Tests and Inspections for Switches:

1. Visual and Mechanical Inspection:

a. Inspect physical and mechanical condition.
b. Inspect anchorage, alignment, grounding, and clearances.
c. Verify that the unit is clean.
d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
e. Verify that fuse sizes and types match the Specifications and Drawings.
f. Verify that each fuse has adequate mechanical support and contact integrity.
g. Inspect bolted electrical connections for high resistance using one of the two following methods:

1) Use a low-resistance ohmmeter.

a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.

2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.

a) Verify bolt-torque levels in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.

h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on the Drawings.
i. Verify correct phase barrier installation.
j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.

2. Electrical Tests:

a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
b. Measure contact resistance across each switchblade fuseholder. Drop values not to exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
c. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.

d. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
e. Perform ground fault test according to NETA ATS 7.14 "Ground Fault Protection Systems, Low-Voltage."

E. Tests and Inspections for Molded Case Circuit Breakers:

1. Visual and Mechanical Inspection:

a. Verify that equipment nameplate data are as described in the Specifications and shown on the Drawings.
b. Inspect physical and mechanical condition.
c. Inspect anchorage, alignment, grounding, and clearances.
d. Verify that the unit is clean.
e. Operate the circuit breaker to ensure smooth operation.
f. Inspect bolted electrical connections for high resistance using one of the two following methods:

1) Use a low-resistance ohmmeter.

a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.

2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.

a) Verify bolt-torque levels in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.

g. Inspect operating mechanism, contacts, and chutes in unsealed units.

2. Electrical Tests:

a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
b. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
c. Perform a contact/pole resistance test. Drop values not to exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.

d. Perform insulation resistance tests on all control wiring with respect to ground. Ensure applied potential is 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable. Test duration is one minute. For units with solid state components, follow manufacturer's recommendation. Verify insulation resistance values are no less than two megohms.

e. Determine the following by primary current injection:

1) Long-time pickup and delay. Pickup values as specified. Trip characteristics not to exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
2) Short-time pickup and delay. Short-time pickup values as specified. Trip characteristics not to exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
3) Ground-fault pickup and time delay. Ground-fault pickup values as specified. Trip characteristics not to exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
4) Instantaneous pickup. Instantaneous pickup values as specified and within manufacturer's published tolerances.

3.7 ADJUSTING

A. Adjust moving parts and operable components to function smoothly and lubricate as recommended by manufacturer.

END OF SECTION 262816

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SECTION 264313 - SURGE PROTECTIVE DEVICES FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Surge protective devices (SPDs) for power distribution systems. SPDs installed integral to electrical equipment meets electrical performance criteria specified herein. SPDs for telecommunications systems, antenna systems, SCADA systems and instruments are included in other Divisions.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 DEFINITIONS

A. I_n: Nominal discharge current.

B. Maximum Continuous Operating Voltage (MCOV): The maximum designated RMS value of the power frequency voltage that may be continuously applied to the mode of protection of an SPD.

C. Metal-Oxide Varistor (MOV): An electronic component with a significant bidirectional, nonlinear current-voltage characteristic.

D. Mode(s), Modes of Protection, or Protection Modes: Electrical paths where the SPD offers defense against transient overvoltages. Examples include: line to neutral (L-N), line to ground (L-G), line to line (L-L), and neutral to ground (N-G).

E. SCCR: Short-circuit current rating.

F. Type 1 SPDs: Permanently connected SPDs intended for installation between the secondary of the service transformer and the line side of the service disconnect overcurrent device.

G. Type 2 SPDs: Permanently connected SPDs intended for installation on the load side of the service disconnect overcurrent device, including SPDs located at the branch panel.

H. Type 3 SPDs: Point of utilization SPDs.

I. Type 4 SPDs: Component SPDs, including discrete components, as well as assemblies.

J. Type 5 SPDs: Discrete component surge suppressors, such as MOVs that may be mounted on a printed wiring board, connected by its leads or provided within an enclosure with mounting means and wiring terminations.

K. Voltage Protection Rating (VPR): A rating selected from UL 1449 list of preferred values assigned to each mode of protection.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product used on project. Include physical and electrical characteristics, features, and options.

B. Specification Compliance:

1. Include a copy of this specification confirming compliance with each paragraph. For deviations, provide detailed commentary to explain the deviation.

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranty.

B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For SPDs to include in operation and maintenance manuals.

B. Warranty documentation.

1.7 WARRANTY

A. Manufacturer’s Special Warranty: Manufacturer agrees to repair or replace SPDs for a period not less than warranty specified in PART 2 for each model described.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, ABB, Eaton, Schneider Electric, or Siemens products are acceptable.

B. Source Limitations: Obtain devices from single source from single manufacturer.

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2.2 PERFORMANCE CRITERIA

A. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing agency recognized by authorities having jurisdiction and marked for intended location and application.

B. Comply with the following standards as applicable:

1. UL 96A, Lightning Protection System Master Label.
2. UL 1283, Electromagnetic Interference Filters for EMI/RFI noise filtration.
3. UL 1449, Surge Protective Devices, CCN VZCA.

C. MCOV: Not less than 115 percent.

D. Nominal discharge current (I_n): 20 kA, unless noted otherwise.

E. Maximum VPR:

1. 277 V (L-N), Systems: 1200 V.
2. 240 V (L-L) Systems: 1200 V.
3. 120 V (L-N) Systems: 700 V.

F. Type 1 or 2, as indicated by connection point on Drawings. Include integral disconnect for Type 1 SPDs.

G. Match voltage, phasing, and frequency of connected power system equipment to be protected.

H. Provide all modes of protection based on the power system configuration.

I. Verify the SCCR rating of the SPD has at least the same rating of the electrical equipment being protected.

J. Protect against surges produced by a 1.2 / 50 microsecond and 8 / 20 microsecond combination waveform generator.

K. Provide LED indicator lights for continuous positive operational status of each protected phase. Lights to be visible without the need to open any compartments.

L. Response Time: One nanosecond or less for any individual component and be self-restoring and fully automatic.

M. Switchboard, branch panels and control panels, up to 600 A equipment bus (480 V): Minimum surge current 100 kA per phase, nominal discharge current 65 kA, 5-year warranty.

N. Branch circuit panels (120/208/240 V single or three phase): Minimum surge current 50 kA per phase, nominal discharge current 10 kA, 5-year warranty.

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PART 3 - EXECUTION

3.1 PREPARATION

A. Layout disconnect and SPD locations to minimize SPD lead length to less than 24 inches and to avoid sharp bends or kinks in leads. Rearrange circuit breakers as necessary in panelboards to achieve.

3.2 INSTALLATION

A. Install SPDs as shown on the Drawings and in accordance with manufacturer’s instructions.

B. Install SPD lead conductors as short as possible (not to exceed 24 inches), gently twist together where practicable with wire size, and route to avoid sharp bends or kinks. Do not splice or extend SPD leads unless specifically permitted by manufacturer and approved by Engineer. Spliced extensions using wire nuts are unacceptable.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative.

1. Compare equipment nameplate data for compliance with Drawings and Specifications.
2. Inspect anchorage, alignment, grounding, and clearances.
3. Verify that electrical wiring installation complies with manufacturer's installation requirements.

B. SPDs that do not pass tests and inspections will be considered defective.

C. Prepare test and inspection reports.

3.4 STARTUP SERVICE

A. Complete startup checks in accordance with manufacturer's instructions.

B. Where alarm contacts report to SCADA system, confirm correct operation.

C. Do not perform insulation-resistance tests of the distribution wiring equipment with SPDs installed. Disconnect SPDs before conducting insulation-resistance tests; reconnect them immediately after the testing is over.

D. Energize SPDs after power system has been energized, stabilized, and tested.

END OF SECTION 264313

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SECTION 265000 - LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Luminaires, components, and accessories.

B. Related Requirements:

1. Section 260010 “Supplemental Requirements for Electrical” for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260923 "Lighting Control Devices" specifies automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors installed by this Section.

1.3 DEFINITIONS

A. BUG Rating: Backlight, uplight, and glare rating for light pollution from exterior luminaires.

B. Correlated Color Temperature (CCT): The absolute temperature (in kelvins) of a blackbody whose chromaticity (color quality) most nearly resembles that of the light source.

C. Color Rendering Index (CRI): The measure of the degree of color shift objects undergo when illuminated by the light source as compared with the color of those same objects when illuminated by a reference light source. The lower the CRI of a light source, the more difficult it is to identify colors and stripes on electronic components and wiring.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product used on project.

1. Include physical data to confirm compliance with luminaire schedule. Include description, features, accessories, finishes, and dimensions of luminaires.
2. Include electrical and lighting data to confirm compliance with luminaire schedule. Include voltage, design life, lumen output, CCT, CRI, photometric data, and energy efficiency data.
3. Organize luminaire data in sequential order based on the luminaire schedule. Use same designations indicated on Drawings.
4. Include emergency lighting units, including batteries and chargers.

5. Include support accessories as applicable.

B. Shop Drawings:

1. Where exterior luminaires deviate in lumen output or photometrics from the basis of design luminaire, submit site photometric plan to verify performance requirements and compliance with local lighting ordinances at property line boundaries.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturers' published instructions.

B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.

B. Warranty documentation.

1.7 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.

B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products, and complying with the applicable IES testing standards.

C. Provide luminaires from a single manufacturer for each luminaire type.

D. Each LED luminaire type binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect exposed surface finishes on lighting equipment by applying strippable, temporary protective covering before shipping.

B. Store luminaires in a dry location in their original packaging, until ready for installation.

1.9 WARRANTY

A. Warranty: Manufacturer and Installed agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

B. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Luminaires, Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Comply with the following standards and UL Category Control Number (CCN) listing criteria as applicable:

1. UL 924, Standard for Emergency Lighting and Power Equipment.

    a. UL CCN FTBR, emergency lighting.
    b. UL CCN FWBO, exit lighting.

2. UL 1598, Luminaires (non-hazardous locations).

    a. UL CCN HYXT, general luminaires and fittings.
    b. UL CCN IFAM, surface mount LED luminaires.
    c. UL CCN IFAW, canopy luminaires.
    d. UL CCN IFAO, recess mount LED luminaires.
    e. UL CCN CDHW, fire resistant luminaires.

3. UL 8750, Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products.

C. Comply with NEMA LE 4 for recessed luminaires.

2.2 LUMINAIRES

A. Refer to luminaire schedule on Drawings for detailed requirements for each luminaire type. Catalog numbers listed on schedules are provided as a design basis for performance and quality desired. Equivalent design and quality from other manufacturers will be acceptable upon Engineer’s approval.

B. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components to be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.
4. Steel: ASTM A36/A36M for carbon structural steel, ASTM A568/A568M for sheet steel.
5. Stainless Steel: Manufacturer's standard grade, ASTM A240/A240M.
6. Galvanized Steel: ASTM A653/A653M.
7. Aluminum: ASTM B209.

C. Variations in metal finishes are unacceptable in the same piece.

D. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit re-lamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during re-lamping and when secured in operating position.

2.3 LUMINAIRE SUPPORT COMPONENTS

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

B. Refer to Drawings for support details.

C. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish to match fixture.

D. Wires: ASTM A641/A641M, Class 3, soft-temper, zinc-coated steel, 12 gage.

E. Rod Hangers: 3/16-inch- minimum diameter, cadmium-plated, threaded steel rod.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

A. If approved by the Engineer, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting.

3.3 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation: Unless more stringent installation requirements are specified in Contract Documents or manufacturers' published instructions, comply with the following:

1. Relevant Article of NFPA 70.
2. NECA NEIS 500 – Standard for Installing Indoor Commercial Lighting Systems.
3. NECA NEIS 501 – Standard for Installing Exterior Lighting Systems.

4. NECA NEIS 502 – Standard for Installing Industrial Lighting Systems.

C. Special Installation Techniques:

1. Install luminaires level, plumb, and square with finished floor or grade unless otherwise indicated.
2. Fasten luminaire to structural support. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems."
3. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260533.13 "Conduits for Electrical Systems" for wiring connections and wiring methods.
4. Install luminaires at height and aiming angle as indicated on Drawings.
5. Coordinate layout and installation of luminaires with other construction.
6. Comply with details indicated on Drawings.
7. Comply with requirements in Section 260553 "Identification for Electrical Systems" to identify luminaires, system components, wiring, cabling, and terminals.

D. Systems Integration: Integrate lighting control devices and equipment with electrical power connections for operation of luminaires as specified.

3.4 FIELD QUALITY CONTROL

A. Inspect each luminaire for damage and cleanliness. Replace damaged luminaires and components. Remove debris and clean luminaire prior to tests, inspections, and acceptance by Engineer.

B. Perform the following tests and inspections:

1. General Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper control operation in all modes.
2. Emergency Lighting Operational Test: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
3. Emergency Lighting Discharge Test: Interrupt normal power supply and confirm adequate illumination is provided for 90 minutes while on battery power.

C. Luminaire will be considered defective if it does not pass tests and inspections.

D. Prepare field quality report certifying verification of correct installation.

END OF SECTION 265000

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SECTION 284621.13 - CONVENTIONAL FIRE ALARM SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fire alarm control unit (existing).
2. Manual fire alarm boxes.
3. System smoke detectors.
4. Heat detectors.
5. Notification appliances.
6. Device guards.
7. Remote annunciator.
8. System printer.

1.3 DEFINITIONS

A. EMT: Electrical Metallic Tubing.

B. FACP: Fire Alarm Control Panel.

C. NICET: National Institute for Certification in Engineering Technologies.

1.4 ACTION SUBMITTALS

A. General Submittal Requirements:

1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Engineer.
2. Shop Drawings shall be prepared by persons with one of the following qualifications:

a. Trained and certified by manufacturer in fire alarm system design
b. NICET-certified fire alarm technician; Level III minimum.
c. Licensed or certified by authorities having jurisdiction.

B. Product Data: For each type of product, including furnished options and accessories.

1. Include construction details, material descriptions, dimensions, and profiles and finishes.
2. Include rated capacities, operating characteristics, and electrical characteristics.

C. Shop Drawings: For fire alarm system.

1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
2. Include plans, elevations, sections, details, and attachments to other work.
3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
4. Detail assembly and support requirements.
5. Include voltage drop calculations for notification-appliance circuits.
6. Include battery size calculations.
7. Include input/output matrix.
8. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
9. Include performance parameters and installation details for each detector.
10. Verify that each duct smoke detector is listed for the complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
11. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale; coordinate location of duct smoke detectors and access to them.

    a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
    b. Show field wiring required for HVAC unit shutdown on alarm.
    c. Locate detectors according to manufacturer's written recommendations.

12. Include floor plans to indicate final outlet locations showing zone designation of each device. Show size and route of cable and conduits and point-to-point wiring diagrams.

D. Delegated-Design Submittal: For notification appliances and smoke (and heat, if any) detectors, in addition to submittals listed above, indicate compliance with performance requirements and design criteria, including analysis data, signed and sealed by the qualified professional engineer responsible for their preparation.

1. Drawings showing the location of each smoke (and heat, if any) detector, ratings of each, and installation details as needed to comply with listing conditions of the device.
2. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72. Calculate spacing and intensities for strobe signals and sound-pressure levels for audible appliances.
3. Indicate audible appliances required to produce square wave signal per NFPA 72.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Seismic Qualification Data: Certificates, for fire alarm control unit, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

D. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire alarm systems and components to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following and deliver copies to authorities having jurisdiction:

a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
b. Provide the "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
d. Riser diagram.
e. Record copy of site-specific software.
f. Provide the "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:

1) Equipment tested.
2) Frequency of testing of installed components.
3) Frequency of inspection of installed components.
4) Requirements and recommendations related to results of maintenance.
5) Manufacturer's user training manuals.

g. Manufacturer's required maintenance related to system warranty requirements.
h. Abbreviated operating instructions for mounting at fire alarm control unit and each annunciator unit.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps for Remote Indicating Lamp Units: Quantity equal to 5 percent of amount installed, but no fewer than one unit.
2. Lamps for Strobe Units: Quantity equal to 5 percent of amount installed, but no fewer than one unit.

3. Smoke and Fire Detectors: Quantity equal to 5 percent of amount of each type installed, but no fewer than one unit of each type.
4. Detector Bases: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.
5. Keys and Tools: One extra set for access to locked or tamper proofed components.
6. Audible and Visual Notification Appliances: One of each type installed.
7. Fuses: Two of each type installed in the system. Provide in a box or cabinet with compartments marked with fuse types and sizes.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project or certified by NICET as fire alarm level II installation (minimum) technician.

B. NFPA Certification: Obtain certification according to NFPA 72 by an NRTL (nationally recognized testing laboratory).

1.9 PROJECT CONDITIONS

A. Perform a full test of the existing system prior to starting work. Document any equipment or components not functioning as designed.

B. Interruption of Existing Fire Alarm Service: Do not interrupt fire alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:

1. Notify Construction Manager and Owner no fewer than seven days in advance of proposed interruption of fire alarm service.
2. Do not proceed with interruption of fire alarm service without Construction Manager's and Owner's written permission.

C. Use of Devices During Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.

1.10 SEQUENCING AND SCHEDULING

A. Existing Fire Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service, and label existing fire alarm equipment "NOT IN SERVICE" until removed from the building.

B. Equipment Removal: After acceptance of new fire alarm system, remove existing disconnected fire alarm equipment and wiring.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace fire alarm system equipment and components that fail in materials or workmanship within specified warranty period.

1. Warranty Extent: All equipment and components not covered in the Maintenance Service Agreement.
2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Source Limitations for Fire Alarm System and Components: Components shall be compatible with existing Silent Knight SK-5208 Conventional Fire Alarm Panel and operate as an extension of existing system. Provide system manufacturer's certification that all components provided have been tested as, and will operate as, a system.

B. Noncoded system dedicated to fire alarm service only.

C. All components provided shall be listed for use with the selected system.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

A. Fire alarm signal initiation shall be by one or more of the following devices and systems:

1. Manual stations.
2. Heat detectors (if any).
3. Smoke detectors.
4. Duct smoke detectors (supervisory signal).
5. Automatic sprinkler system water flow.

B. Fire alarm signal shall initiate the following actions:

1. Continuously operate alarm notification appliances.
2. Identify alarm zone at fire alarm control unit and remote annunciators.
3. Transmit an alarm signal to the remote alarm receiving station.
4. Switch heating, ventilating, and air-conditioning equipment controls to fire alarm mode.
5. Close smoke dampers in air ducts of designated air-conditioning duct systems.
6. Activate emergency lighting control.
7. Activate emergency shutoffs for gas and fuel supplies.
8. Record events in the system memory.
9. Record events by the system printer.
10. Indicate device in alarm on the remote annunciator.

C. Supervisory signal initiation shall be by one or more of the following devices and systems:

1. Valve supervisory switch.
2. User disabling of zones or individual devices.
3. Loss of communication with any panel on the network.

D. System trouble signal initiation shall be by one or more of the following devices and actions:

1. Open circuits, shorts, and grounds in designated circuits.
2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3. Loss of primary power at fire alarm control unit.
4. Ground or a single break in internal circuits of fire alarm control unit.
5. Abnormal ac voltage at fire alarm control unit.
6. Break in standby battery circuitry.
7. Failure of battery charging.
8. Abnormal position of any switch at fire alarm control unit or annunciator.
9. Hose cabinet door open.

E. System Trouble and Supervisory Signal Actions:

1. Initiate notification appliances.
2. Annunciate at fire alarm control unit and remote annunciators.
3. Record the event on system printer.
4. After a time-delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.
5. Transmit system status to building management system.

2.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Fire alarm control unit and raceways shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.4 FIRE ALARM CONTROL UNIT

A. The existing fire alarm control unit is a Silent Knight model SK-5208 conventional multizone system with 10 Initiation inputs, 8 Class B (Style B) and 2 zones. Per device datasheet, supervised zone expanders and I/O modules can be mounted remotely from the main control panel.

B. Circuits:

1. Pathway Survivability: Level 0.

2. Serial Interfaces:

a. One existing RS 232 port available for printer, and programming.

C. Smoke-Alarm Verification:

1. Initiate audible and visible indication of an "alarm-verification" signal at fire alarm control unit.
2. Activate an approved "alarm-verification" sequence at fire alarm control unit and detector.
3. Record events by the system printer.
4. Sound general alarm if the alarm is verified.
5. Cancel fire alarm control unit indication and system reset if the alarm is not verified.

D. Notification-Appliance Circuit: Operation shall sound a three-pulse temporal pattern .

E. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.

F. Printout of Events: On receipt of signal, print alarm, supervisory, and trouble events. Identify zone and function. Include type of signal (alarm, supervisory, or trouble) and date and time of occurrence. Differentiate alarm signals from all other printed indications. Also print system reset event, including same information for zone, date, and time. Commands initiate the printing of a list of existing alarm, supervisory, and trouble conditions in the system and a historical log of events.

G. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory, and digital alarm communicator transmitters shall be powered by the 24-V dc source.

1. Alarm current draw of the entire fire alarm system shall not exceed 80 percent of the power-supply module rating.

H. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.

1. Batteries: Sealed, valve-regulated, recombinant lead acid.

I. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.5 MANUAL FIRE ALARM BOXES

A. General Requirements for Manual Fire alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.

1. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type.
2. Station Reset: Key- or wrench-operated switch.

2.6 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:

1. Operating at 24-V dc, nominal.
2. Detectors shall be four or two-wire type, consistent with and in-line with current installations.
3. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
4. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.
5. Provide multiple levels of detection sensitivity for each sensor, with alarm-verification feature.

B. Photoelectric Smoke Detectors: Comply with UL 268.

C. Ionization Smoke Detector: Comply with UL 268.

D. Duct Smoke Detectors: Photoelectric type complying with UL 268A.

1. Remote indication and test station. Operating key switch initiates an alarm test.
2. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector for smoke detection in HVAC system ducts.
3. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
4. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

2.7 HEAT DETECTORS

A. General Requirements for Heat Detectors: Comply with UL 521.

B. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 deg F.

1. Mounting: Adapter plate for outlet box mounting or twist-lock base interchangeable with smoke-detector bases.

2.8 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.

B. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet from the horn, using the coded signal prescribed in UL 464 test protocol.

C. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- high letters on the lens.

1. Rated Light Output:

a. 15/30/75/110 cd, selectable in the field.

2. Mounting: Wall mounted unless otherwise indicated.
3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
4. Flashing shall be in a temporal pattern, synchronized with other units.
5. Strobe Leads: Factory connected to screw terminals.
6. Mounting Faceplate: Factory finished, red.

2.9 REMOTE ANNUNCIATOR

A. Description: Annunciator functions shall match those of fire alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire alarm control unit, including acknowledging, silencing, resetting, and testing.

1. Mounting: Flush or Surface cabinet, NEMA 250, Type 1 consistent with the existing installations.

B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

2.10 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632.

B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire alarm control unit and automatically capture one or two] telephone line(s) and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service online is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.

C. Local functions and display at the digital alarm communicator transmitter shall include the following:

1. Verification that both telephone lines are available.
2. Programming device.
3. LED display.
4. Manual test report function and manual transmission clear indication.
5. Communications failure with the central station or fire alarm control unit.

D. Digital data transmission shall include the following:

1. Zone of the alarm initiating device.
2. Zone of the supervisory signal.
3. Zone of the trouble initiating device.
4. Loss of ac supply.
5. Loss of power.
6. Low battery.
7. Abnormal test signal.
8. Communication bus failure.

E. Secondary Power: Integral rechargeable battery and automatic charger.

F. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

2.11 SYSTEM PRINTER

A. Printer shall be listed and labeled as an integral part of fire alarm system.

2.12 DEVICE GUARDS

A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.

1. Factory fabricated and furnished by device manufacturer.
2. Finish: Paint of color to match the protected device.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.

1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.

B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EQUIPMENT INSTALLATION

A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."

B. Connecting to Existing Equipment: Verify that existing fire alarm system is operational before making changes or connections.

1. Connect new equipment to the existing control panel in the existing part of the building.
2. Connect new equipment to the existing monitoring equipment at the supervising station.
3. Expand, modify, and supplement the existing control and monitoring equipment as necessary to extend the existing control and monitoring functions to the new points. New components shall be capable of merging with the existing configuration without degrading the performance of either system.

C. Install wall-mounted equipment, with tops of cabinets not more than 78 inches above the finished floor.

D. Manual Fire Alarm Boxes:

1. Install manual fire alarm box in the normal path of egress within 60 inches of the exit doorway.
2. Mount manual fire alarm box on a background of a contrasting color.
3. The operable part of manual fire alarm box shall be between 42 inches and 48 inches above floor level. All devices shall be mounted at the same height unless otherwise indicated.

E. Smoke or Heat Detector Spacing:

1. Comply with the "Smoke-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
2. Comply with the "Heat-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
3. Smooth ceiling spacing shall not exceed 30 feet.
4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Annex A or Annex B in NFPA 72.
5. HVAC: Locate detectors not closer than 36 inches from ceiling mounted, and 60 inches from wall mounted air-supply diffuser or return-air opening.
6. Luminaires: Locate detectors not closer than 12 inches from any part of a luminaire and not directly above pendant mounted or indirect lighting.

F. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place, except during system testing. Remove cover prior to system turnover.

G. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches long shall be supported at both ends.

1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.

H. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.

I. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.

J. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches below the ceiling. Install all devices at the same height unless otherwise indicated.

K. Device Location-Indicating Lights: Locate in public space near the device they monitor.

3.3 PATHWAYS

A. Pathways above recessed ceilings and in non-accessible locations may be routed exposed.

1. Exposed pathways located less than 96 inches above the floor shall be installed in EMT.

B. Pathways shall be installed in EMT.

C. Exposed EMT shall be painted red enamel.

3.4 CONNECTIONS

A. Connect supervised interface devices to the following devices and systems. Install the interface device less than 36 inches from the device controlled.

1. Smoke dampers in air ducts of designated HVAC duct systems.
2. Supervisory connections at valve supervisory switches.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 270553 "Identification for Communications Systems."

B. Install framed instructions in a location visible from fire alarm control unit.

3.6 GROUNDING

A. Ground fire alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire alarm control unit.

B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.7 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by owner’s representative and authorities having jurisdiction.

B. Perform the following tests and inspections:

1. Visual Inspection: Conduct the visual inspection prior to testing.

    a. Inspection shall be based on completed record Drawings and system documentation that is required by NFPA 72 in Chapter 10 "Fundamentals," Section 10.18.21 "Completion Documents, Preparation."
    b. Comply with NFPA 72, Chapter 14, "Inspection, Testing, and Maintenance," Section 14.3, "Inspection" and the "Visual Inspection Frequencies" Table; retain the "Initial/Reacceptance" column and list only the installed components.

2. System Testing: Comply with NFPA 72, Chapter 14, "Inspection, Testing, and Maintenance," Section 14.4 "Testing" and the "Test Methods" Table.
3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
4. Test visible appliances for the public operating mode according to manufacturer's written instructions.

C. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

D. Fire alarm system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.8 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain fire alarm system.

END OF SECTION 284621.13

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SECTION 312000 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Work includes:

1. Excavation for structures, foundations, manholes, vaults, electrical manholes, conduits, cables, raceways and ducts, pipes, paving; bulk excavations; grading; and related work such as sheeting, bracing and dewatering.
2. Clearing and stripping, procurement of on-site and imported fill material, excavating, placing, and compacting fill and backfill, structural excavating and backfilling, transportation and storage of excess earthwork materials; disposal of unsuitable, waste, and surplus materials; restoration of excavation and trench surfaces; and subsidiary work necessary to complete the grading of developed areas to conform with required lines, grades, and slopes.
3. Site and geotechnical report review.
4. Do not initiate extra work without written notification to Owner and Engineer and receiving Owner’s written approval in response.
5. Protect existing structures and utilities that remain.
6. Delegated design.

B. Related Requirements:

1. Section 312333 “Trenching and Backfilling” for stated work.
2. Section 321623 “Sidewalks”.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

C. Coverage: Pass of compaction equipment over the complete surface area of exposed lift or subgrade to receive compaction.

D. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work]
2. Unauthorized Additional Excavation: Excavation as directed by Engineer to correct work not in compliance with Contract Documents, which will be performed without additional compensation.
3. Bulk Excavation: Excavation more than 10 feetin width and more than 30 feetin length.
4. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, provided without additional compensation.

E. Finished Grade: Required final grade elevation indicated on Drawings. Spot elevations take precedent over proposed contours.

F. In-the-Dry: An excavation subgrade where groundwater level: has been lowered to at least 2 feetbelow lowest level of excavation; is stable with no ponded water, mud, or muck; is able to support construction equipment without rutting or disturbance; and is suitable for placement and compaction of fill material, pipe, or concrete foundations.

G. Objectionable Material: Includes topsoil, organic matter, contaminated soil, construction debris, perishable materials, snow, ice, frozen earth, and rocks or lumps of cemented soils over 6 inchesin maximum dimension.

H. Optimum Moisture Content: Moisture content (percent by dry weight) corresponding to maximum dry density of the same material as determined by ASTM Test Method D1557.

I. Overexcavation: Removal of unsuitable soil or objectionable material at or below the normal grade of excavation or subgrade as indicated on Drawings.

J. Percent Compaction: Required in-place dry density of the material, expressed as a percentage of the maximum dry density of the same material, as determined in the laboratory by ASTM Test Method D1557.

K. Structures: Buildings, wet wells, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, manholes and vaults, or other man-made stationary features constructed above or below the ground surface.

L. Subgrade: Required surface of subsoil, borrow fill, or compacted fill that is immediately beneath site improvements, especially dimensioned fill, paving, or other surfacing material.

M. Unsuitable Soil: Includes existing fill materials, organic soils, weak native soils, or clays with a plasticity index of greater than 30, and any materials that cannot be properly placed and compacted as specified.

N. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

O. Zone of Influence: A line extending at least 2 feetbeyond foundation or pipeline edge, then outward and downward at a slope of 1 horizontal to 1 vertical. Do no excavation below foundation of existing structures or pipeline.

P. Professional Engineer: Registered Professional Engineer meeting project qualifications and who is hired by Contractor.

Q. The Engineer: The Engineer or designated representative hired by Owner.

1. Approval given by The Engineer does not relieve responsibilities for performing the work in accordance with Contract Document requirements.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct pre-excavation conference at Project site.

1. Review methods and procedures related to earthmoving, including, but not limited to, the following:

a. Personnel and equipment needed to make progress and avoid delays.
b. Coordination of Work with utility locator service.
c. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.
d. Extent of trenching by hand or with air spade.
e. Field quality control.
f. Phasing of the Work.

1.5 ACTION SUBMITTALS

A. Coordinate various submittal types required by this Section with requirements of support of excavation and rock removal submittals specified in other Sections.

B. Site Characterization Data: Submit following information regarding off-site source and material:

1. Site location.
2. Present and past usage of the source site and material.
3. Previously existing reports associated with an assessment of source site relating to presence of oil or other hazardous materials.
4. Location within the site from which the material will be obtained.

C. Samples: Submit a representative sample weighing approximately 50 poundsof each fill material, filter sand, and crushed stone contained in sealed 5 gallon containers, at least 30 calendar days prior to date of anticipated use of each material.

D. Submit laboratory test results for fill materials that include maximum density, gradation, Atterberg limits, sand equivalent, and other applicable criteria, at least 72 hours prior to importing or placing fill.

1.6 DELEGATED DESIGN SUBMITTALS

A. Delegated-Design Submittal: For temporary excavation slope stability evaluation designs; Section 014000 “Quality Requirements” for additional delegated design requirements.

B. Slope Stability Evaluation: Submit a temporary excavation slope stability evaluation in accordance with OSHA for temporary slopes over 20 feet in height or where existing or proposed facilities or property limits are located at the top of the slope and within a distance from the top of the slope equal to the slope height.

1. Prepare evaluation by a licensed Professional Engineer registered in the State of California where the work occurs.

C. Qualifications Statement: Submit qualifications for licensed professional.

1.7 INFORMATIONAL SUBMITTALS

A. Construction and Operations Plan: Submit proposed methods of construction, including earthwork operations, excavation limits, slopes, fill material moisture conditioning and handling, compaction equipment, excavation support systems designs, backfilling and filling and compaction, and material sources.

1. Submit work sequence plan.
2. Submit excavation support system plan as prepared by registered Professional Engineer complying with requirements stated in previous Article.

B. Submit copies of field daily reports by soil technician at the end of each work day that earthwork and grading operations occur.

C. Upon completion of earthwork and grading operations, submit an as-graded map showing density test numbers and locations, a table of density test results and depths, and a certification of compliance by geotechnical engineer in charge.

D. Qualification Data: For qualified testing agency to conduct geotechnical observation, testing and documentation. include qualifications of firm, resumes of soil technicians assigned to the project, and licensed geotechnical engineer in charge.

1. Firm Qualifications: Meet ASTM D3740.
2. Soil Technicians: Have minimum three years demonstrated experience in earthwork and grading operations and satisfy certification requirements of agency having local jurisdiction.

a. The Engineer reserves right to request substitution of soil technicians assigned to field work. Do not substitute assigned soil technicians without prior approval of The Engineer.

E. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

1.8 QUALITY ASSURANCE

A. Delegated Design Engineer: Licensed professional engineer experienced in design of specified Work and licensed in the jurisdiction of the project location.

B. Excavation, trenching, sheeting, bracing, and similar work complies with requirements of OSHA excavation safety standards, 29 CFR Part 1926 Subpart P and State and local authorities having jurisdiction. Where conflict between OSHA, State and local regulations exists, apply most stringent requirements.

C. At least three working days prior to starting any excavation, notify the appropriate regional notification center for underground utilities and underground utility owners who are not members of notification center, DigAlert, https://www.digalert.org/.

D. Quality Control Testing for Off-site Borrow Materials:

1. Chemical testing will not be required where site characterization of off-site borrow sources indicates that soils are acceptable for use. If site characterization data or materials are suspected of being contaminated, perform chemical testing as directed by The Engineer with no additional compensation.
2. Chemical Test Data: Test each material source requiring testing by a person experienced in sample collection who is a registered Professional Engineer or geologist or certified groundwater or environmental professional registered in the State of California. Submit samples of each proposed material to a chemical analytical laboratory, certified by the governing agency, for following analyses:

    a. Volatile Organic Compounds: EPA 8240 plus Hazardous Substance List (HSL) Parameters.
    b. Acid and Base Neutral Extractable Organic Compounds: EPA 8270.
    c. Pesticides and PCBs: EPA 8080.
    d. Total Petroleum Hydrocarbons: Infrared Method, EPA 9071/418.1.
    e. Thirteen Priority Pollutant Metals: EPA 7000 Series.
    f. Total Cyanide: EPA 9012.

3. Obtain and test off-site borrow samples in accordance with criteria established by The Engineer. Submit results for review and approval prior to use on site.

1.9 FIELD CONDITIONS

A. Be responsible for construction layout and reference staking necessary for proper control and satisfactory completion of structures, cutting, filling, grading, drainage, fencing, embankment improvements, curbing, and other appurtenances.

B. Perform construction layout and staking by a Professional Surveyor or Professional Engineer registered in State of California where project occurs, experienced and skilled in construction layout and staking requirements.

C. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earthwork operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

D. Utility Locator Service: Notify DigAlert for area where Project is located before beginning earthwork operations.

E. Do not commence earthwork operations until temporary site fencing and erosion- and sedimentation-control measures are in place, as required.

F. Do not direct vehicle or equipment exhaust towards protection zones.

G. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. On-Site Fill Material: Earth and rock material obtained at project site during excavation, following clearing and stripping, from which any Unsuitable Soil or Objectionable Material has been removed.

B. General: Provide imported fill materials when sufficient satisfactory soil materials are not available from excavations.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, fencing, landscaping, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

1. If necessary, remove and restore or replace curbing, driveway aprons, and fencing after performing backfilling work.
2. Replace existing facilities damaged by construction with new material fully equal to existing without additional compensation.

B. Prior to and During Earthwork Operations:

1. Use excavation support system for excavations within the zone of influence for existing structures or utilities.
2. Do not permit excavations below base level of adjacent foundations or retaining walls, unless excavation design and bracing includes an analysis of structure’s stability

supported by the foundation. When necessary due to project conditions, incorporate required bracing and foundation underpinning.

C. Test Pits:

1. Perform exploratory excavation work, test pits, for purpose of verifying the location of underground utilities and structures and to check for unknown utilities and structures, prior to commencing excavation work.
2. As earthwork progresses, perform test pits for the purpose of compaction testing. Pause operations and provide safe access for testing personnel.
3. Backfill and compact test pits as soon as desired information has been obtained. Stabilize backfilled surfaces in accordance with approved erosion and sedimentation control plans.

D. Clearing and Stripping. Initially clear and strip ground surfaces beneath planned structures and in areas requiring excavation or filling of organic material and debris. Do not use those materials as On-Site Fill Material; remove from the site and properly disposed or reused as topsoil in landscape areas.

1. After clearing of walkways, trees, and turf, excavate soils to a minimum depth of 50-inches below grade and at least 5-feet horizontally beyond the new-building perimeter. Strip footings not to exceed 24-inch width or embedment depth. Excavation depths may increase if exposed native materials at 60-inches exhibit visible macroporosity.

E. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

F. Saw cut existing pavement with a saw, wheel, or pneumatic chisel along straight lines before excavating.

3.2 DEWATERING AND DRAINAGE

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff and groundwater seepage away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

C. Prior to excavation, verify groundwater will be at required.

D. Accomplish dewatering by methods that preserve undisturbed state of subgrade soils. Dewater in a manner to prevent boiling, detrimental under-seepage, or disturbance at excavation base.

3.3 SUPPORT OF EXCAVATION

A. Provide excavation support if required.

B. Install excavation support in accordance with reviewed Shop Drawings prior to beginning excavation work. Maintain excavation supports that are required to remain in place, if applicable, as indicated on Drawings or as required by approved Shop Drawings.

C. Owner or The Engineer may direct that certain excavation supports remain in place or be cut off at any specific elevation. Supports directed by Owner or The Engineer to be left in place and not so designated on Contract Documents will be paid for according to Contract provisions for [**unit prices**] [**changes in the Work**].

D. The right of Owner or The Engineer to direct that certain excavation supports remain in place not to be construed as creating any obligation on Owner or The Engineer to give such direction, nor does failure to give such direction relieve liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of a failure to leave in place sufficient excavation supports to prevent any movement of the ground or damage to adjacent structures.

E. Construct temporary excavation slopes in accordance with the requirements of OSHA excavation safety standards and approved Shop Drawings.

F. Where allowed, carefully remove excavation supports in a manner without endangering the Work or other adjacent structures, utilities, or property. Immediately fill voids left or caused by withdrawal of supports with sand and compact.

3.4 EXCAVATION

A. Include material of every description and of whatever substance encountered as an unclassified excavation.

B. General: Excavate on-site soils using standard earthmoving equipment. Excavation in dense soil or rock may require special equipment. Do not plough, scrape, or dig earth with machinery so near to finished subgrade to result in excavation of or disturbance of below grade material.

C. Make excavations to grades indicated on Drawings and in widths sufficient for laying of pipe, construction of the structure, installing bracing, excavation supports, dewatering and drainage facilities, and working clearances.

D. Perform excavation in-the-dry and accomplished by methods which preserve the natural undisturbed condition of subgrade soils.

E. Moisture Sensitive Soils: Use a smooth-edge bucket to excavate last one foot of depth when excavation is to end in such soils.

F. If excavation bottom is removed below the limits shown on Drawings, specified, or directed by The Engineer, refill with structural fill, lean concrete, or other material satisfactory to The Engineer without additional compensation.

G. When excavation has reached prescribed depths, notify The Engineer who will observe the conditions. If materials and conditions are not satisfactory, The Engineer will issue instructions for corrective procedures. The Engineer will be the sole judge as to whether the work has been accomplished satisfactorily.

H. Subgrade soils that have become soft, loose, quick, or otherwise unsatisfactory due to inadequate excavation, dewatering, or other construction methods in the opinion of The Engineer, remove existing soil and replaced with structural fill or lean concrete as acceptable to The Engineer at Contractor's expense.

I. Proof roll exposed subgrades for foundations with at least two overlapping coverages of a vibratory drum roller with a minimum static drum weight of 10 ton. Conduct proof-rolling in presence of The Engineer. The Engineer will waive this requirement, if in its opinion the subgrade will be rendered unsuitable by such proof-rolling.

1. Confined Areas: Proof-roll with hand operated vibratory equipment that is approved by The Engineer.

J. Perform overexcavation at The Engineer’s request to remove unsuitable soil, objectionable material, or other materials as determined by The Engineer and to such depth and width as directed. Replace with suitable material as directed by The Engineer.

1. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

K. Perform excavation for pipelines beneath structures and excavation for footings with excavating equipment operating from the subgrade for the structure, while in-the-dry and in a manner preserving the undisturbed state of subgrade soils.

L. When excavations have reached the required subgrade, including any allowances for working mats or base materials and prior to their placement, notify soils testing laboratory to verify suitability of existing subgrade soils for anticipated foundation and structural loadings.

1. If existing subgrade soils are determined to be unsuitable, follow direction provided by The Engineer regarding removal and replacement with suitable materials.
2. Notify Engineer if the revised work scope would modify cost and thereby entitle a change to the Contract Sum. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

M. Replace overexcavation beyond the limits and depths required by Contract Documents using structural fill, lean concrete, or other material satisfactory to The Engineer without additional compensation.

N. Trenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

3.5 SUBGRADE PREPARATION

A. Notify Engineer when excavations have reached required subgrade.

B. Maintain excavated subgrade in-the-dry condition.

C. Prior to fill placement, remove objectionable material which includes, but not be limited to, pavement, topsoil, organic matter, contaminated soil, construction debris, perishable materials, snow, ice, frozen earth, and rocks or lumps of cemented soils over 6 inches in maximum dimension.

D. For subgrades consisting of granular soils, proof roll the final subgrade using at least four coverages of a vibrator plate compactor.

E. Where existing subgrade contains a significant amount of clay or cohesive soils, over-excavate sufficiently below the bottom of structure for placement of a lean concrete working mat. Remove loose or soft material from the subgrade immediately prior to placing lean concrete working mat.

F. Remove and replace soft subgrades or unusable material with structural fill, lean concrete, or other material satisfactory to the.

G. During wet or freezing weather, or in areas where exposed subgrade consists of moisture-sensitive soils, take measures to protect foundation excavations once they have been approved by The Engineer. Protective measures include, but are not limited to, placing insulation blankets, placing a layer of fill, pea gravel, crushed rock, or lean concrete on the exposed subgrade, or covering the exposed subgrade with a plastic tent.

1. If additional overexcavation is required due to the subgrade not being protected against wet or freezing weather, perform additional work without additional compensation.

H. Notify Engineer to observe conditions following subgrade preparation and prior to fill placement. If existing subgrade soils are determined to be unsuitable, follow direction provided by The Engineer regarding removal and replacement with suitable materials.

1. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

3.6 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust. Protect from precipitation.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.7 FILL PLACEMENT AND COMPACTION PROCEDURES

A. Fill and Backfill: Place materials in lifts to suit specified compaction requirements to required lines and grades, making allowances for settlement and placement of cover materials, such as topsoil or sod. Correct soft spots or uncompacted areas.

B. Do not place or compact fill and backfill when materials are too wet to properly compact.

1. In-place Soil Moisture Content: Maximum of three percentage points above optimum moisture content of soil, as determined by laboratory test of moisture-density relation appropriate to specified level of compaction.

C. Structural Fill and Embankment Fill: Construct to required lines and grades, making allowances for settlement and placement of cover materials, such as topsoil and sod. Correct soft spots or uncompacted areas.

D. Ensure fill material is free of snow, ice, frost, and frozen earth. Do not place fill materials on frozen surfaces or surfaces covered by snow, ice, or frost.

E. Complete installation of dampproofing systems prior to placing various types of fill or backfill around structures.

F. If subgrade slopes more than 10 percent, step subgrade to produce a stable, horizontal surface for placement of fill materials. Scarify existing subgrade slope to a depth of at least 6 inches.

G. Compact filled slopes by slope rolling and trimming or overfill and trim back to plan grade to expose a firm, smooth surface free of loose material.

H. Do not allow fill lifts to contain stones with a dimension larger than 2/3 the specified loose measure lift thickness.

I. Perform compaction in open areas using compaction equipment by any of the following methods:

1. Fully loaded ten-wheel trucks or front-end loaders.
2. Tractor dozers weighing minimum of 30,000 pounds.
3. Heavy vibratory rollers.

J. Confined Compaction: Perform compaction in confined areas, including areas within a 45-degree angle extending upward and outward from the base of a wall, and in areas where the use of large equipment is impractical, using hand-operated vibratory equipment or mechanical tampers.

1. Do not exceed lift thickness of 6 inches, measured before compaction, when using hand operated equipment.

K. Moisture condition on-site fill material prior to placement, unless demonstrated to The Engineer in-place moisture conditioning methods can achieve the required moisture content.

L. Conduct compaction of each specified lift of fill materials by a minimum of four complete coverages with acceptable compaction equipment to a specified density as a percentage of maximum dry density as determined by ASTM D1557, unless otherwise specified.

M. Use structural fill required beneath foundations or slabs on grade, except sidewalks. Place and compact structural fill in even lifts having a maximum thickness of 8 inches, measured before compaction.

N. Use select fill and backfill material placed within 10 feet of all structures. Uniformly place and compact select fill around the structure in even lifts having a maximum thickness of 6 inches, measured before compaction.

O. Use common fill in areas beyond those designated for structural fill or select fill, unless shown or otherwise specified. Place in even lifts having a maximum thickness of 6, measured before compaction.

P. Place impervious fill in controlled, even lifts having a maximum thickness (measured before compaction) of 6 inches.

1. Permeability: Compact to attain a reading of less than 1×10^{-7} cm/sec.
2. Moisture Content: Compact to optimum moisture content of minus 2 percent to plus 3 percent.

3.8 COMPACTION REQUIREMENTS

A. Perform in-place testing of compacted fill lifts to measure in-place density and water content according to ASTM D6938 and ASTM D1557.

B. Beneath Foundations and Slabs-on-Grade, except sidewalks: Compact top 12 inches of existing subgrade and each layer of fill, if applicable to:

1. Maximum Dry Density: Minimum of 90 percent for ASTM D1557 for onsite soils or granular import, or 95 percent for ASTM D1557 for crushed-rock construction aggregates.
2. Moisture Content: At or near its optimum moisture content of minus 2 percent to plus 3 percent.

C. Area Around Structures: Within 10 feet,compact each fill or backfill layer to:

1. Maximum Dry Density: Minimum of 90 percent for ASTM D1557 for onsite soils or granular import, or 95 percent for ASTM D1557 for crushed-rock construction aggregates.
2. Moisture Content: At or near its optimum moisture content of minus 2 percent to plus 3 percent.

D. Embankments, Lawn, or Unimproved Areas: Does not include embankments under roadways and earth dam structures. Compact each fill or backfill layer to:

1. Maximum Dry Density: Minimum of 90 percent for ASTM D1557 for onsite soils or granular import, or 95 percent for ASTM D1557 for crushed-rock construction aggregates.
2. Moisture Content: At or near its optimum moisture content of minus 1 percent to plus 4 percent.

E. Sidewalks: Compact each fill layer to:

1. Maximum Dry Density: Minimum of 90 percent for ASTM D1557 for onsite soils or granular import, or 95 percent for ASTM D1557 for crushed-rock construction aggregates.
2. Moisture Content: At or near its optimum moisture content of minus 2 percent to plus 3 percent.

F. Roads, Paved Areas, and Roadway Embankments: Compact each layer of fill or backfill to:

1. Maximum Dry Density: Minimum of 90 percent for ASTM D1557 for onsite soils or granular import, or 95 percent for ASTM D1557 for crushed-rock construction aggregates.
2. Moisture Content: At or near its optimum moisture content of minus 2 percent to plus 3 percent.

3.9 DISPOSAL OF UNSUITABLE, WASTE, AND SURPLUS EXCAVATED MATERIALS

A. Remove unsuitable soil, objectionable material, waste, and surplus excavated material and disposed of off-site. Materials may be temporarily stockpiled in an area within the limits of construction that does not disrupt construction activities, create any nuisances or safety hazards, or otherwise restricts access to work site.

3.10 GRADING

A. Perform grading to lines and grades shown on Drawings. Remove objectionable materials encountered within the limits indicated and disposed of off-site. Completely and continuously drained and dewatered subgrades throughout the grading process. Install temporary drains and drainage ditches to intercept or divert surface water that may affect the execution or condition of grading work.

B. If it is not possible at the time of grading to place material in its proper section of the Work, stockpile it in approved areas for later use. No additional compensation will be made for stockpiling or double handling of excavated materials.

C. In cut areas, remove loose or protruding rocks in slopes to line or finished grade of the slope. Uniformly dress, cut, and fill slopes to slope cross-section and alignment shown on Drawings, unless otherwise directed by The Engineer.

3.11 FIELD QUALITY CONTROL

A. Test and observe materials as described in this Article. Cooperate by allowing free access to work for selection of test materials and observations.

B. General Testing Requirements:

1. At Structures: Prior to placement of bedding material, concrete work mats, structural fill or structural concrete, coordinate with Soils Testing Laboratory to verify suitability of existing subgrade soil.

2. Backfill and Fill: Prior to and during the placement of backfill and fill coordinate with Soils Testing Laboratory to perform in-place soil density tests to verify that backfill and fill material has been placed and compacted in accordance with specified compaction requirements.

    a. Provide minimum 48 hours' notice prior to placement of backfill and fill.

3. Subgrade: Do not cover with fill without observation, testing, and approval by Soils Testing Laboratory.

    a. Earthwork activities performed without properly scheduled inspection are subject to removal and replacement or additional testing as directed by The Engineer without additional compensation.

C. Test materials by a certified independent laboratory, acceptable to The Engineer, demonstrating conformance with project requirements. Deliver test reports and material certifications to The Engineer before using any material in the work.

1. Owner will make payment for laboratory and in place density testing.

D. If field test results are not in conformance with project requirements, costs involved in correcting deficiencies in compacted materials to satisfaction of The Engineer without additional compensation.

E. Earthwork activities performed without properly scheduled inspection are subject to removal and replacement or additional testing as directed by The Engineer without additional compensation.

F. Testing methods comply with latest ASTM or equivalent AASHTO Standards applicable during bidding.

G. During placement of bedding, backfill, and fill, perform in-place soil density testing to confirm that fill material has been compacted in accordance with project requirements. The Engineer may designate areas to be tested. Notify Engineer at least 72 hours in advance of scheduled compaction testing. In place soil density tests on backfill and fill material as required by authorities having jurisdiction, project geotechnical report, but in no instance, less than those listed:

1. Structures and Embankments: At least one density and moisture content test for each 2,500 square feetof surface area for each lift of fill at embankment, structure, and manhole locations.
2. Trench Excavations: At least one nuclear density and one moisture content test at a maximum of 50 feet intervals for each lift of fill placed or as directed by The Engineer.
3. The Engineer may designate supplemental areas to be tested at additional compensation.

H. Materials which have been previously tested may be subjected to further testing from time to time and may be rejected, if it is determined that results do not conform to project requirements. Immediately remove rejected materials when directed by The Engineer, notwithstanding results of previous testing.

I. The Engineer or Owner may conduct additional soil testing. Cooperate fully in allowing additional test to be made, including free access to the work.

3.12 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by The Engineer; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

END OF SECTION 312000

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SECTION 312333 - TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes delegated design of trench excavation and support, backfilling, and compaction.

B. Related Requirements:

1. Section 312000 “Earthwork” for related earthwork activities.
2. Section 331416 “Site Water Utility Distribution Piping” for water piping and bedding from building to utility service.
3. Section 333100 “Sanitary Sewerage Piping” for sanitary sewer piping and bedding from building to utility service.

1.3 UNIT PRICES

A. Basis of Measurement: By linear feet of trench to be excavated.

B. Basis of Payment: Includes excavating existing soil.

1.4 DEFINITIONS

A. Percent Compaction: Means at least the stated percentage of maximum density as determined by ASTM D1557, Method D.

1.5 ACTION SUBMITTALS

A. Submit proposed method of backfilling and compaction prior to start of Work.

1.6 INFORMATIONAL SUBMITTALS

A. Material Test Reports: For material excavated from trench for re-use as backfill, by a qualified testing agency.

1.7 QUALITY ASSURANCE

A. Comply with following regulations:

1. Occupational Safety and Health Administration (OSHA): 29 CFR Part 1926 Subpart P.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store excavated materials to prevent erosion of soil type materials and contamination of adjacent water sources.

PART 2 - EXECUTION

2.1 EXAMINATION

A. Examine that erosion and sedimentation controls are in place and comply with project requirements and authorities having jurisdiction.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

2.2 PREPARATION

A. Where excavation activities occur across active vehicular or pedestrian circulation paths, use temporary controls specified in Division 01 to maintain circulation during operations required by this Section. Maintain temporary controls for each day circulation paths are restricted.

B. Coordinate work of this Section with materials specified in other Sections of Division 31.

C. Identify required lines, levels, contours, and datum locations.

D. Protect features to remain-in-place including benchmarks, existing structures**,** sidewalks, paving, curbs, etc. from excavating equipment and vehicular traffic.

E. Maintain and protect above and below grade utilities indicated to remain.

2.3 TRENCH EXCAVATION

A. Trench excavation includes material of every description and substance encountered, except rock and boulders.

B. Cut rigid and flexible pavement with a saw, wheel, or pneumatic chisel along straight lines before excavating.

C. Strip and stockpile topsoil from grassed areas crossed by trenches.

1. At Contractor's option when required, topsoil may be disposed of and replaced with approved topsoil of equal quality.

D. While excavating and backfilling is in progress, maintain traffic and protect utilities and other property.

E. Excavate trenches to indicated depths and in widths sufficient and of practical minimum for pipe laying, bracing, and pumping and drainage facilities.

F. Accomplish excavation and dewatering by methods preserving undisturbed state of subgrade soils. Excavate trench by machinery to or just below designated subgrade, if material remaining in trench bottom is no more than slightly disturbed.

1. Remove subgrade soils that become soft, loose, quick, or otherwise unsatisfactory due to inadequate excavation, dewatering, or other construction methods and replace with screened gravel fill acceptable to the Engineer at Contractor's expense.

G. Use care when working in clay and organic silt soils, which are particularly susceptible to disturbance due to construction operations. When excavation is to end in such soils, use a smooth-edge bucket to excavate the last 12 inches of depth.

H. Where pipe is to be laid in screened gravel bedding, excavate trench by machinery to normal depth of pipe, provided material remaining in trench bottom is no more than slightly disturbed.

I. Where pipe is to be laid directly on trench bottom, manually perform final excavation, providing a flat-bottom, true to grade upon undisturbed material. Make bell holes required by project conditions.

2.4 DISPOSAL OF MATERIALS

A. Stack excavated material without excessive surcharge on trench bank or obstructing free access to hydrants and gate valves. Avoid inconvenience to traffic and abutters. Segregated excavated material for use in backfilling as specified below.

B. Do not remove excavated material from work site, except as directed by the Engineer. When removal of surplus materials is approved by the Engineer, dispose of such surplus material in approved designated areas.

C. Should conditions make it impracticable or unsafe to stack material adjacent to trench, haul and store material at a location provided. When required, re-handled and use it in backfilling trench.

2.5 SHEETING AND BRACING

A. Provide and maintain sheeting and bracing required by Federal, State, or local safety requirements to support sides of excavation and prevent loss of ground which could endanger personnel, damage, adjacent structures, or delay the work.

1. Engineer may order additional supports placed at Contractor’s expense if it is determined that at any point sufficient or proper supports have not been provided. Provide sufficiency of supports even with compliance of such order. Take care to prevent voids outside of sheeting; if voids are formed, immediately fill and ram them.

B. When moveable trench bracing such as trench boxes, moveable sheeting, shoring or plates are used to support trench sides, take care in placing and moving the boxes or supporting bracing to prevent pipe movement, disturbance of pipe bedding, or screened gravel backfill.

1. Rigid Pipe Installation (such as R.C., V.C., A.C.): Raise that portion of box extending below mid-diameter above this point prior to moving box ahead to install next pipe. Perform to prevent separation of installed pipe joints due to box movement.
2. Flexible Pipe Installation (such as PVC): Do not allow trench boxes, moveable sheeting, shoring, or plates to extend below mid-diameter of pipe. As trench boxes, moveable sheeting, shoring, or plates are moved, place screened gravel to fill voids created. Re-compact screened gravel and backfill to provide uniform side support for pipe.

C. Engineer may give permission to use steel sheeting in lieu of wood sheeting for entire job wherever sheeting use is necessary. Include cost for use of sheeting in bid items for pipe, including full compensation for driving, bracing, and later removal of sheeting.

D. Carefully remove sheeting and bracing in manner to not endanger construction of other structures, utilities, or property, whether public or private. Immediately refill voids left after withdrawal of sheeting using sand by ramming with tools especially adapted to that purpose and watering or otherwise directed by the Engineer.

E. No payment will be given for sheeting, bracing, or other support during progress of the work. No payment will be given for sheeting left in trench for Contractor's convenience.

F. Leave sheeting driven below mid-diameter of pipe in place from driven elevation to at least 12 inches above top of pipe.

2.6 TEST PITS

A. Excavation of test pits may be required for purpose of locating underground utilities or structures as an aid in establishing the precise location of new work.

B. Backfill test pits as soon as desired information has been obtained. Maintain backfilled surface appropriate for travel until resurfaced.

2.7 EXCAVATION BELOW GRADE AND REFILL

A. Drain trench completely and effectively be in-the-dry, whatever the nature of unstable material encountered or groundwater conditions.

B. If excavating below grade through error or for their own convenience, through failure to properly dewater the trench, or disturbs subgrade before dewatering is sufficiently complete, the Engineer may direct Contractor to excavate below grade as set forth in following Paragraph, where work shall be performed at Contractor’s own expense.

C. If material at trench bottom consists of fine sand, sand and silt or soft earth which may work into the screened gravel, even with effective drainage, remove subgrade material to extent directed. Refill excavation with a 6 inch layer of coarse sand or a mixture graded from coarse sand to fine pea stone to form a filter layer preserving voids in pipe gravel bed. Obtain

composition and gradation of gravel shall be approval by the Engineer prior to placement. Place screened gravel in 6 inch layers thoroughly compacted up to normal grade of pipe. If directed by the Engineer, use bank-run gravel for refill of excavation below grade.

D. Subsurface Drainage Geotextile: Non-woven filter fabric may be substituted for filter layer, if approved by the Engineer.

2.8 BACKFILLING

A. Begin backfilling as soon as practicable after laying and jointing pipe and continue expeditiously. Place bedding gravel of specified type for pipe installed up to 12 inches over the pipe.

B. Construct an impervious dam or bulkhead cutoff of clay or other impervious material in the trench, as directed by the Engineer, to interrupt unnatural flow of groundwater after construction is completed. Key dam into trench bottom and sidewalls. Provide at least one clay or other impervious material dam in pipe bedding between each manhole where directed or every 300 feet, whichever is less.

C. Where pipes are laid cross-country, fill remainder of trench with common fill material in layers not to exceed 12 inches and mounded 6 inches above existing grade or as directed by the Engineer. Where a loam or gravel surface exists prior to cross-country excavations, remove, conserve and replace it to full original depth as part of the work under pipe items. Where necessary, remove excess material during clean-up process, so that ground may be restored to its original level and condition.

D. Where pipes are laid in streets, backfill remainder of trench up to a depth of 12 inches below bottom of specified permanent paving with select common fill material in layers not to exceed 12 inches and thoroughly compacted. Use bank-run gravel for subbase layer of paving and compact in 6 inches layers.

E. To prevent longitudinal pipe movement, do not dump backfill material into trench and then spread, until selected material or screened gravel has been placed and compacted to a level at least 12 inches over the pipe.

F. Bring backfill up evenly on all sides. Thoroughly compact each layer of backfill material by rolling, tamping, or vibrating with mechanical compacting equipment or hand tamping to 95 percent compaction according to ASTM D1557 or 98 percent according to ASTM D698. If rolling, use a suitable roller or tractor being careful to compact fill throughout full width of trench.

G. Do not compact by puddling or water jetting.

H. Use hand or pneumatic ramming with tools weighing at least 20 pounds for compacting in confined areas. Spread and compact material in layers not exceeding 6 inches thick, an uncompacted loose measurement.

I. Use granular fill material as backfill around structures. Spread and compact specified backfill under and over pipes connected to structures.

J. Do not place bituminous paving in backfill. Do not use frozen material under any circumstances.

K. Broom and hose-clean road surfaces immediately after backfilling. Employ dust control measures throughout construction period.

2.9 RESTORING TRENCH SURFACE

A. Where trench occurs adjacent to paved streets, in shoulders, sidewalks, or in cross-country areas, thoroughly consolidate backfill and maintain surface as the work progresses. If settlement takes place, immediately deposit additional fill to restore ground level.

B. In and adjacent to streets, use 12 inches of trench backfill below specified initial pavement consisting of compacted bank-run gravel. If Contractor wants to use material excavated from trench as gravel subbase for pavement replacement, take samples at intervals not to exceed 500 feet of material and test by an independent testing laboratory at Contractor’s expense. Use only materials approved by the Engineer.

C. Restore surface of driveways or other areas which are disturbed by trench excavation to a condition at least equal to that existing before work began.

D. In areas where pipeline passes through grassed areas, remove and replace sod or loam and seed surface at Contractor's own expense.

END OF SECTION 312333

Division 32

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SECTION 321623 - SIDEWALKS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Concrete paving for sidewalks.

B. Related Requirements:

1. Section 030130.71 “Modifications to Existing Concrete” for form materials, water-stops, and accessories.
2. Section 033010 “Miscellaneous Cast-in-Place Concrete” for cast-in-place or in-situ concrete for structural building frames, slabs on fill or grade, and other concrete components.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Submit required information regarding concrete.
2. Mix Design:

    a. Submit concrete mix design for each concrete strength prior to commencement of Work.
    b. Submit separate mix designs if admixtures are required for hot- and cold-weather concrete Work.
    c. Identify mix ingredients and proportions, including admixtures.

3. Identify chloride content of admixtures and whether or not chloride was added during manufacture.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

B. Source Quality-Control Submittals: Indicate results of shop tests and inspections.

C. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

D. Qualifications Statement:

1. Submit qualifications for manufacturer and installer.

1.5 QUALITY ASSURANCE

A. Obtain cementitious materials from same source throughout.

B. Perform Work according to City of Redlands Standards.

C. Qualifications

1. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
2. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Store materials according to manufacturer instructions.

C. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

1.7 AMBIENT CONDITIONS

A. Minimum Conditions: Do not place concrete if base surface temperature is less than 40 deg. F, or if surface is wet or frozen.

B. Subsequent Conditions: Maintain minimum 50 deg. F, for not less than 72 hours after placing, and at a temperature above freezing for remainder of curing period.

1.8 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Supply materials per City of Redlands Standards and Standard Specifications for Public Works Construction.

2.2 FABRICATION

A. Reinforcing:

1. Comply with City of Redlands Standards.

B. Hooks:

1. As required by City of Redlands Standards

2.3 MIXES

A. Concrete:

1. Comply with City of Redlands Standards and Standard Specifications for Public Works Construction.

2.4 FINISHES

A. Reinforcement:

1. Comply with City of Redlands Standards and Standard Specifications for Public Works Construction.

B. Testing: Comply with ASTM C94.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that compacted subgrade is dry and ready to support paving and imposed loads.

B. Verify that gradients and elevations of subgrade are as indicated on Drawings.

C. Verify reinforcing placement for proper size, spacing, location, and support.

3.2 PREPARATION

A. Moisten substrate to minimize absorption of water from fresh concrete.

B. Notify Engineer minimum 24 hours prior to commencement of concreting operations.

3.3 INSTALLATION

A. Subgrade:

1. As specified in Section 312000 “Earthwork.”
2. Comply with City of Redlands Standards.

B. Forms:

1. Place and secure forms and screeds to correct location, dimension, profile, and gradient.
2. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
3. Clean forms and coat with form oil each time before concrete is placed.
4. Wood Forms: Thoroughly wet with water before concrete is placed.

C. Reinforcement:

1. Comply with City of Redlands Standards and Standard Specifications for Public Works Construction.

D. Placing Concrete:

1. Comply with City of Redlands Standards and Standard Specifications for Public Works Construction.

E. Joints:

1. Place continuous transverse expansion joints at 5-foot intervals or width of sidewalk, whichever is less.
2. Filler:

    a. Place joint filler between paving components and building or other appurtenances.
    b. Recess top of filler 1/4 inch for sealant installation.

3. Provide scored or sawn joints at 3-foot intervals between sidewalks and curbs.
4. Saw-cut contraction joints 3/16 inch wide at optimum time after finishing, cutting one-third into depth of slab.
5. Seal joints as required by City of Redlands Standards and Standard Specifications for Public Works Construction.

F. Exposed Aggregate:

1. Apply surface retarder where exposed aggregate finish is required.
2. Wash exposed aggregate surface with clean water and scrub with stiff bristle brush, exposing aggregate.

G. Finishing:

1. Finishing per City of Redlands Standards and Standard Specifications for Public Works Construction.

H. Curing:

1. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
2. Mats:

a. Cover exposed surface with two or more layers of wetted burlap, overlapping each other minimum 6 inches.
b. Maintain burlap continuously saturated and in contact with concrete for minimum seven days.

I. Backfilling: After curing, backfill, grade, and compact adjacent disturbed area as indicated.

3.4 TOLERANCES

A. Maximum Variation of Surface Flatness: 1/4 inch in 10 feet.

B. Maximum Variation from True Position: 1/4 inch.

C. Line and Grade for Forms: 1/8 inch in any 10-foot- long section.

3.5 FIELD QUALITY CONTROL

A. Section 017300 “Execution”: Requirements for testing, adjusting, and balancing.

B. Inspection and Testing:

1. Comply with City of Redlands Standards and Standard Specifications for Public Works Construction .
2. Samples:

a. Sampling Procedures: Comply with ASTM C172/C172M.
b. Cylinder Molding and Curing Procedures: Comply with ASTM C31, field cured.
c. Sample concrete and make one set of three cylinders for every 150 cu. yd. or less of each class of concrete placed each day, and for every 5,000 sq. ft. of surface area paving.
d. Make one additional cylinder during cold-weather concreting, and field cure.

3. Cylinder Compressive Strength:

a. Comply with ASTM C39.
b. Acceptance:

1) Average Compressive Strength of Three Consecutive Tests: Maximum 500 psi less than specified compressive strength.

c. Test one cylinder at seven days, and two cylinders at 28 days.
d. Retain one cylinder for testing when requested by Engineer.
e. Dispose of remaining cylinders if testing is not required.

4. Slump, Temperature, and Air Content:

a. Measure for each compressive-strength concrete sample.
b. Slump: Comply with ASTM C143.
c. Air Content: Comply with ASTM C231/C231M.
d. Temperature: Comply with ASTM C1064.

5. Records:

a. Maintain records of placed concrete items.
b. Record date, location of pour, quantity, air temperature, number of test samples taken.

3.6 PROTECTION

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, rain and flowing water, and mechanical injury.

B. Do not permit traffic over paving for minimum 7 days after finishing.

C. Damaged Concrete:

1. Remove and reconstruct concrete that has been damaged for entire length between scheduled joints.
2. Refinishing damaged portion is not acceptable.
3. Dispose of damaged portions.

3.7 ATTACHMENTS

A. Concrete Sidewalks: 3000-psi 28-day concrete, 4 inches thick, buff color portland cement, exposed aggregate finish.

END OF SECTION 321623

Division 33

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SECTION 331416 - SITE WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipe and fittings for Site water line, including potable water, fire water line and irrigation water.
2. Underground pipe markers.
3. Bedding and cover materials.

B. Related Requirements:

1. Section 312000 “Earthwork” for soils and aggregates for backfill in trenches.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Pipe and Fittings:

1. Basis of Measurement: Linear foot.
2. Basis of Payment: Includes hand-trimming excavation, pipe and fittings, bedding, connection and tap to building service piping, and connection to existing potable waterlines.

B. Valves:

1. Basis of Measurement: By unit.
2. Basis of Payment: Includes valve, fittings, and accessories.

C. Backflow Preventers:

1. Basis of Measurement: By unit.
2. Basis of Payment: Includes backflow preventer, fittings, and accessories.

1.4 ACTION SUBMITTALS

A. Product Data: Pipe materials, pipe fittings, valves, and accessories.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturer's Certificate: Products meet or exceed specified requirements.

B. Field Quality Control Submittals: Results of Contractor-furnished tests and inspections.

1.6 CLOSEOUT SUBMITTALS

A. Project Record Documents: Actual locations of piping mains, valves, connections, thrust restraints, and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.7 QUALITY ASSURANCE

A. Perform Work according to City of Redlands Standard Specifications.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Unload, store, and handle site water utility distribution piping according to manufacturer instructions.

PART 2 - PRODUCTS

2.1 WATER PIPING

A. Copper Tubing: Per ASTM B88. Type K, annealed.

1. Fittings: ASME B16.22, wrought copper.
2. Joints: AWS A5.8 (A5.8M) BCuP silver braze.
   Encase buried copper tubing in polyethylene encasing wrap. No tears or other damage permitted in the polyethylene encasing wrap. PVC Pipe: ASTM D1785, Schedule 80.
3. Fittings: Per ASTM D2466, PVC.
4. Joints: Per ASTM D2855. Solvent weld type.

2.2 TAPPING SLEEVES AND VALVES

A. Tapping Sleeves:

1. Manufacturers:

   a. Kennedy Valve Company; a division of McWane, Inc.
   b. Mueller Co.
   c. U.S. Pipe.
   d. Furnish materials according to City of Redlands Standard Specifications.

B. Description: Ductile iron.

1. Working Pressure: 200 psi minimum.
2. Armored End Gaskets: For the full area of the sleeve flanges.
3. Nuts and Bolts: Type 304 stainless steel.
4. Type: Dual compression.
5. Outlet Flange Dimensions and Drilling: Per ASME B16.1, Class 125 and MSS SP-60.

C. Tapping Valves: Per AWWA C500.

1. Furnish materials according to City of Redlands Standard Specifications standards.

2.3 HYDRANTS

A. Hydrants: According to City of Redlands Standard Specifications requirements.

2.4 REDUCED-PRESSURE BACKFLOW PREVENTERS

A. Manufacturers:

B. Per ASSE 1013. Diaphragm type, differential pressure relief, located between two check valves.

1. Body: Bronze.
2. Internal Parts: Bronze.
3. Springs: Stainless steel.

C. Check Valves: Independently operating, spring-loaded.

1. Provide third check valve opening under back pressure in case of diaphragm failure.
2. Vent Outlet: Non-threaded.

D. Provide two gate valves, one strainer, and four test cocks.

E. Double Check Valve Assemblies: Per ASSE 1012. Two independently operating check valves, with intermediate atmospheric vent.

1. Body: Bronze.
2. Internal Parts: Corrosion resistant.
3. Springs: Stainless steel.

2.5 UNDERGROUND PIPE MARKERS

A. Plastic Ribbon Tape: Brightly colored, continuously printed. 6 inches wide by 4 mil thick or larger.

1. Manufactured for direct burial service.

B. Trace Wire: Electronic detection materials for nonconductive piping products.

1. Unshielded, 10 gage, THWN-insulated copper wire.
2. Conductive tape.

2.6 MATERIALS

A. Bedding and Cover:

1. Bedding: Fill, as specified in Section 312000 “Earthwork” and as shown on the Drawings.
2. Cover: Fill as specified in Section 312000 “Earthwork” and as shown on the Drawings.

B. Soil Backfill from Above Pipe to Finish Grade:

1. Soil: as specified in Section 312000 “Earthwork” and as shown on the Drawings.
2. Subsoil: No rocks over 6 inches in diameter, frozen earth, or foreign matter.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that building service connections and municipal utility water main sizes, locations, and elevations are as indicated on Drawings.

3.2 PREPARATION

A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, and remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare pipe connections to equipment with flanges or unions.

D. Protect and support existing distribution piping and appurtenances as Work progresses.

3.3 INSTALLATION

A. Bedding:

1. Excavate pipe trench as specified in Section 312000 and as shown on the Drawings.
2. Place bedding material at trench bottom.
3. Level fill materials in continuous layers not exceeding 6 inch compacted depth.
4. Compact per Section 312000 “Earthwork.”
5. Backfill: Place fill materials as specified in Section 312000 “Earthwork” and as shown on the Drawings.

B. Piping:

1. Maintain separation of water main from sewer piping according to City of Redlands Standard Specifications.
2. Group piping with other Site piping work whenever practical.
3. Install pipe to elevations indicated on Drawings.
4. Install ductile iron piping and fittings: in accordance with requirements of the manufacturer and according to AWWA C600 or as otherwise provided herein.
5. Install PVC piping and fittings in accordance with requirements of the manufacturer and according to AWWA C605 or as otherwise provided herein.
6. As soon as the excavation is complete to normal grade of the bottom of the trench:

    a. Place, compact and grade bedding to provide firm, uniform and continuous support for the pipe.
    b. Excavate bell holes so that only the barrel of the pipe bears upon the bedding. Blocking under the pipe will not be permitted.
    c. Place bedding evenly on each side of the pipe to mid-diameter and use hand tools to force the bedding under the haunches of the pipe and into the bell holes
    d. Place bedding to 12 inches above the top of the pipe.
    e. Place backfill above the bedding; placing the initial 3 feet of backfill above the bedding in 1-foot compacted layers.
    f. Do not operate directly over the pipe until sufficient backfill has been placed to ensure that such compaction equipment will not have a damaging effect on the pipe.

7. Close ends of the pipe with watertight plugs when installation is not in progress. Prevent deflection, using joints or fittings as required when crossing other utilities.
8. Cut pipes by machine only, leaving a smooth cut at right angles to the axis of the pipe. Bevel pipe to conform to bevels.
9. Check pipe to ensure proper connection with adjoining pipe. Match inverts and grade.
10. Do not drive pipe to grade with excessive force that could damage the pipe. Take all steps to prevent from floating in the trench.
11. When moveable trench bracing such as trench boxes, moveable sheeting, shoring or plates are used to support the sides of the trench, prevent moving the boxes or supporting bracing to prevent movement of the pipe, or disturbance of the pipe bedding and the backfill.
12. Do not extend trench boxes, moveable sheeting, shoring or plates to extend below top of the pipe.
13. Repair or replace defective pipe.

C. Joints:

1. For push-on type PVC pipe:

    a. Lay pipe with bell ends looking ahead.
    b. Insert a rubber gasket in the groove of the bell end of the pipe and clean and lubricate joint surfaces.
    c. Inset the plain end in alignment with the bell and pushed into place.
    d. Check that the reference mark on the spigot end is flush with the end of the bell.

2. Mechanical joints at valves, fittings, hydrants, and where designated in accordance with the AWWA C111 and the instructions of the manufacturer. Suitable PVC to cast iron adaptors installed prior to installing fittings. PVC beveled spigot cut flush prior to insertion in mechanical joint pipe. To assemble the joints in the field, thoroughly clean the joint surfaces and rubber gasket with soapy water before tightening the bolts. Tighten bolts to the specified torques. Under no condition use extension wrenches or pipe over handle of ordinary ratchet wrench to secure greater leverage.
3. Route pipe in straight line.
4. Install access fittings to permit disinfection of water system performed per City of Redlands Standards.
5. Establish elevations of buried piping with not less than 3 feet of cover.

D. Pipe Markers: Install plastic ribbon tape continuous over top of pipe.

E. Coordinate with trench Work according to City of Redlands General Permit Conditions and Trench Specifications.

F. Valves and Appurtenances:

1. Clean and disinfect valves and appurtenances prior to installation in accordance with City of Redlands Water Systems Standard Specifications.
2. Utilize same procedures as specified under applicable type connecting pipe joint and valves.
3. Verify torquing requirements with the manufacturer.
4. Valves 3-in. in diameter or less: Rotate valve operators and indicators to display toward normal operation locations.
5. Center floor boxes, valve boxes, extension stems, and low floor stands and install vertically centered over operating nut, with couplings as required and elevation of box top adjusted to conform to elevation of finished floor surface or grade.

G. Pipe Sleeves: Install 18-gage galvanized sheet metal sleeve surrounding service main to 6 inches above floor and 6 feet minimum below grade. Size for 2 inches minimum of glass fiber insulation stuffing.

H. Disinfection Procedure: Flush and disinfect system as specified in City of Redlands Water Systems Standard Specifications.

3.4 TOLERANCES

A. Install pipe within tolerance of 5/8 inch.

3.5 FIELD QUALITY CONTROL

A. Pressure Test System According to AWWA C600 and following:

1. Test Pressure: 150 psig or 50 psi in excess of maximum static pressure, whichever is greater.
2. Conduct hydrostatic test for at least two hours.

3. Slowly fill with water section to be tested and expel air from piping by installing corporation cocks at high points.
4. Close air vents and corporation cocks after air is expelled and raise pressure to specified test pressure.
5. Observe joints, fittings, and valves under test. Remove and renew cracked pipes, joints, fittings, and valves showing visible leakage and retest.
6. Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate.
7. Maintain pressure within plus or minus 5 psi of test pressure.
8. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of test.
9. Compute maximum allowable leakage using the following formula: L = SD x sqrt(P)/C. When pipe under test contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each size.

    a. L: Testing allowance, in gph
    b. S: Length of pipe tested, in feet
    c. D: Nominal diameter of pipe, in inches
    d. P: Average test pressure during hydrostatic test, in psig
    e. C: 148,000

10. When test of pipe indicates leakage greater than allowed, locate source of leakage, make corrections, and retest until leakage is within allowable limits.
11. Correct visible leaks regardless of quantity of leakage.

B. Compaction Testing for Bedding: Comply with ASTM D1557.

C. When tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

D. Frequency of Compaction Tests: maximum of 250 feet intervals, no less than two per pipe reach installed.

END OF SECTION 331416

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SECTION 333100 - SANITARY UTILITY SEWERAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sanitary sewerage gravity piping.
2. Pipe markers.
3. Bedding and cover materials.

B. Related Requirements:

1. Section 312000 “Earthwork” for soils for backfill in trenches.
2. Section 312333 “Trenching and Backfilling” for backfill in trenches.

1.3 DEFINITIONS

A. Bedding: Fill placed under, beside, and directly over pipe, prior to subsequent backfill operations.

1.4 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Pipe and Fittings:

1. Basis of Measurement: By linear feet.
2. Basis of Payment: Includes hand trimming, excavation, bedding, pipe and fittings, and connection to building service piping and to onsite sewer and backfilling.

B. Installation, quality control testing, startup, and restoration included in the measurement and payment items listed above.

1.5 COORDINATION

A. Coordinate Work of this Section with termination of sanitary sewer connection outside building, connection to onsite sewer, and trenching.

B. Notify City and Plant staff at least 72 hours prior to construction.

1.6 ACTION SUBMITTALS

A. Product Data: Submit manufacturer catalog cuts and other information indicating proposed materials to be used, accessories, details, and construction information.

B. Shop Drawings: Showing layout and details of pipe, reinforcement, joints, gaskets, connector pipe to the new sewer manhole and existing VCP, special fittings and the name of the pipe manufacturer. A schedule of pipe lengths (including the length of individual pipes by diameter) for the entire job.

1.7 INFORMATIONAL SUBMITTALS

A. Manufacturer's Certificate: Products meet or exceed specified requirements.

B. Manufacturer Instructions: Special procedures required to install specified products.

C. Prior to each shipment of pipe, submit certified test reports that the pipe for this Contract was manufactured and tested in accordance with the ASTM Standards specified herein.

D. Submit information on quality control testing including dimensional drawings of any mandrels or other ovality testing equipment.

E. Field Quality-Control Submittals: Results of Contractor-furnished tests and inspections.

F. Documentation the fine and coarse aggregates used in manufacture of concrete pipe comply with specifications.

1. Documentation no more than 6 months old.
2. Source of the aggregates and the date of the analysis.

G. Results of the compressive strength tests to the Engineer.

1.8 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record locations of pipe runs, connections, cleanouts, and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.9 QUALITY ASSURANCE

A. Perform Work according to City of Redlands standards.

1.10 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience and approved by manufacturer.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer’s original packaging and inspect for damage.

B. Storage: Store materials according to manufacturer instructions.

C. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Block individual and stockpiled pipe lengths to prevent moving.
3. Provide additional protection according to manufacturer instructions.
4. Protect materials from weather and UV exposure.

1.12 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Field verify fit-up to existing infrastructure prior to fabrication.
3. Confirm size, depth and orientation of existing VCP sewer pipes entering/exit the new sewer manhole.
4. Document field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 SANITARY SEWERAGE PIPING

A. Vitrified Clay Pipe per ASTM C700.

1. Nominal Diameter: 6 inches.
2. End Connections: Bell and spigot style, with compression joints.
3. Fittings: VCP.
4. Joints: Polyester or polyurethane compression joints per ASTM C425.

B. Plastic Pipe: Polyvinyl chloride (PVC) per ASTM D3034, SDR-35.

1. Inside Nominal Diameter: 6 inches).
2. End Connections: Bell and spigot style, with rubber-ring-sealed gasket joint.
3. Fittings: PVC.
4. Joints: Elastomeric gaskets per ASTM F477.

2.2 MATERIALS

A. Bedding and Cover:

1. Bedding: Fill as specified in Section 312000 " Earthwork" and as shown on the Drawings.
2. Cover: Fill as specified in Section 312000 **"**Earthwork" and as shown on the Drawings.
3. Soil Backfill from Above Pipe to Finish Grade:

a. Soil as specified in Section 312000 "Earthwork" and as shown on the Drawings.
b. Subsoil with no rocks over 6 inches in diameter, frozen earth, or foreign matter.

2.3 ACCESSORIES

A. Pipe Markers: As required by City of Redland Standards.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that trench cut is ready to receive Work.

B. Verify that excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

A. Type of correcting materials (fine aggregate, coarse aggregate, or lean concrete) depends on type of subsoil, percolation characteristics, and compaction requirements.

B. Correct over-excavation with fine aggregate.

C. Remove large stones or other hard materials that could damage pipe or impede consistent backfilling or compaction.

D. Protect and support existing sewer lines, utilities, and appurtenances.

E. Utilities:

1. Maintain profiles of utilities.
2. Coordinate with City and Plant Staff to eliminate interference.
3. Notify Engineer if crossing conflicts occur with sewer crossing above existing water pipes, or with less than 12" vertical separation between the new sewer and water pipes.

3.3 INSTALLATION:

A. Install Work according to City of Redlands Standards

B. Piping:

1. Install pipe, fittings, and accessories according to ASTM C12 and seal joints watertight.
2. Verify that drainage system is shown on Drawings or will be included on Shop Drawings. Drawing details should describe location of aggregate types in relation to pipe and pipe bedding, dimensions of cut trench width, and details of connections to other Work.
3. Lay pipe to slope gradients as indicated on Drawings.
4. Maximum Variation from Indicated Slope: 1/8 inch in 10 feet. Install pipe with a negative / downward oriented slope unless explicitly stated in the Drawings.
5. Install bedding at sides and over top of pipe, to minimum compacted thickness of 6 inch.
6. Backfill and compact as specified in Section 312000 “Earthwork.”
7. Do not displace or damage pipe when compacting.
8. Connect to building sanitary sewer outlet and onsite sewer system as indicated on the Drawings.
9. Pipe Markers: As specified in City of Redlands Standards.
10. Install Site sanitary sewage system piping to within 5 feet of building, and connect to building sanitary waste system.

3.4 FIELD QUALITY CONTROL

A. Request inspection by Owner’s Representative prior to and immediately after placing bedding.

B. Testing: If tests indicate that Work does not meet specified requirements, remove Work, replace, and retest.

1. Perform testing on Site sanitary sewage system according to City of Redlands Standards.

3.5

3.5 PROTECTION

A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION 333100

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APPENDIX

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APPENDIX A
CHECKLIST OF LABOR LAW REQUIREMENTS

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CHECKLIST OF LABOR LAW REQUIREMENTS
TO REVIEW AT JOB CONFERENCE MEETINGS

Name (print) _____Date _____

Company _____Project _____

The Federal and State labor law requirements applicable to the contract are composed of, but not limited to, the following:

1. Payment of Prevailing Wage Rates

The contractor to whom the contract is awarded and its subcontractors hired for the public works project are required to pay not less than the specified general prevailing wage rates to all workers employed in the execution of the contract. The contractor is responsible for ascertaining and complying with all current general prevailing wage rates for crafts and any rate changes that occur during the life of the contract. Information on all prevailing wage rates and all rate changes are to be posted at the job site for all workers to view.

2. Apprentices

It is the duty of the contractor and subcontractors to employ registered apprentices on the public works project under Labor Code Section 1777.5.

3. Penalties

There are penalties required for contractor's/subcontractor's failure to pay prevailing wages and for failure to employ apprentices, including forfeitures and debarment under Labor Code Sections 1775; 1776; 1777.1; 1777.7 and 1813.

4. Certified Payroll Reports

Under Labor Code Section 1776, contractors and subcontractors are required to keep accurate payroll records showing the name, address, social security number and work classification of each employee and owner performing work; also the straight time and overtime hours worked each day and each week, the fringe benefits, and, the actual per diem wage paid to each owner, journey person, apprentice worker or other employee hired in connection with the public works project. Employee payroll records shall be certified and shall be made available for inspection at all reasonable hours at the principal office of the contractor/subcontractor, or shall be furnished to any employee, or his/her authorized representative on request, pursuant to Labor Code Section 1776. Each contractor and subcontractor shall submit its weekly certified payroll reports to the LCR from the agency no less than weekly or within ten days of request. In the event that there has been no work performed during a given week, the certified payroll report shall be annotated: "No work" for that week. Under Labor Code Section 1776(h) there are penalties required for contractor's/ subcontractor's failure to maintain and submit copies of certified payroll records on request. **For projects bidding after April 1, all contractors will need to upload their certified payroll to the Department of Labor Standards Enforcement website. Effective Jan. 1, 2016, ALL projects will require contractors to upload all certified payroll. This requirement is in addition to the request for payrolls by the City of Redlands;

5. Nondiscrimination in Employment

There exist prohibitions against employment discrimination under Labor Code Sections 1735 and 1777.6, the Government Code, the Public Contracts Code, and Title VII of the Civil Rights Act of 1964.

6. Kickbacks Prohibited

Contractors and subcontractors are prohibited from recapturing wages illegally or extracting "kickbacks" from employee wages under Labor Code Section 1778.

7. Acceptance of Fees Prohibited

There exists a prohibition against contractor/subcontractor acceptance of fees for registering any person for public work under Labor Code Section 1779; or for filling work orders on public works contracts pursuant to Labor Code Section 1780.

8. Listing of Subcontractors

All prime contractors are required to list properly all subcontractors hired to perform work on the public works projects covering more than one-half of one percent, pursuant to Government Code 4100 et seq.

9. Properly Licensed and Registered

Contractors are required to be licensed properly and to require that all subcontractors be properly licensed. Penalties are required for employing workers while unlicensed under Labor Code Section 1021 and under the California Contractor License Law found at Business and Professions Code Section 7000 et seq. Contractors and subcontractors are also required to be registered with the Division of Labor Standards Enforcement to work on public works projects in California. Requirements for registration and penalties for not being registered are found in Labor Code 1773.3.

10. Unfair Competition Prohibited

Contractors and subcontractors are prohibited from engaging in unfair competition as specified under Business and Professions Code Sections 17200 to 17208.

11. Workers Compensation Insurance

Labor Code 1861 requires contractors and subcontractors be insured properly for workers compensation.

12. OSHA

Contractors and subcontractors are required to abide by the Occupational, Safety and Health laws and regulations that apply to the particular construction project.

13. Undocumented Workers

Contractors and subcontractors are prohibited by the Federal government against hiring undocumented workers, and must secure proof of eligibility/citizenship from all workers.

14. Itemized Wage Statements

Contractors and subcontractors must provide itemized wage statements to employees per Labor Code 226.

In accordance with Federal and State laws and with the awarding agency contract documents, the undersigned prime contractor wishes to assure the City of Redlands that it intends to comply with the above-referenced labor law requirements, fully understanding that failure to comply with the above requirements may subject it to penalties as provided above.

Contractor	**City of Redlands**
_____	_____
Name Printed	Name Printed
_____	_____
Signature	Signature
_____	_____
Title	Title
_____	_____
Date	Date

IMPORTANT NOTICE

New Requirements for Contractors Working on California Public Works / Prevailing Wage Projects

Significant changes in prevailing wage law have recently been made that affect all contractors working on Public Works Projects within California. Please note the following important information:

CONTRACTOR REGISTRATION REQUIREMENT

By April 1, 2015, all contractors must be registered with the Division of Labor Standards Enforcement (DLSE) to work on public works projects in California.

WHO must register?
All contractors and subcontractors working on public works projects in California must be registered. This includes prime contractors, subcontractors and sole owner/operators- everyone performing labor on a public works project.

WHEN is registration required?
Contractors must be registered with the DLSE to bid on all public works projects that bid after March 1, 2015. All contractors working on public works projects must be registered by April 1, 2015. Registration is valid until June 30 of each year and may be renewed annually. Registrations are currently being accepted.

WHERE do I register?
Registration is done online at:
https://efiling.dir.ca.gov/PWCR/ActionServlet?action=displayPWCRegistrationForm

HOW MUCH is the fee?
Contractor registration fee is currently set at $300 but may increase each year. This fee shall be paid during the initial registration and each annual renewal.

DO I qualify for registration?
Contractors will need to meet minimum qualification standards to be registered. These include:

- Be properly licensed with the Contractors State License Board for your trade.
- Provide evidence of workers compensation insurance (if applicable).
- Be in good standing (Have no outstanding liabilities for wages, damages, penalties due to an employee or the State, may not be under State or Federal debarment).

WHAT happens if I don't register?
Unregistered contractors working on or bidding for public works projects will be subject to an immediate $2,000 fine and the $300 registration fee to continue working on the project. Unregistered contractors may be removed from the project by the Awarding Agency. Contractors found working on public works projects without being registered also risk not being approved for registration by DLSE.

ELECTRONIC CERTIFIED PAYROLL REPORTING REQUIREMENTS

Prevailing wage law has been changed to require contractors to submit certified payrolls electronically to the DLSE.

WHO is required to submit certified payrolls?
All contractors, subcontractors and sole owner/operators will be required to submit certified payrolls electronically to the DLSE.

WHEN do I need to submit certified payrolls electronically?
If your project is awarded after April 1, 2015, electronic payroll submission is required immediately. Otherwise, electronic payroll submission will be required for all projects awarded on or after January 1, 2016.

WHERE do I submit my certified payrolls?
For now, certified payrolls can be submitted by contractors to the DLSE at: https://apps.dir.ca.gov/ecpr/DAS/AltLogin This website address will change when the DLSE implements their online electronic database system which still has not been developed. Alliant will notify contractors when this system is available.

DO I still need to submit hard copy certified payrolls?
The City of Redlands will still require hard copy submission of certified payroll reports per your contract. The requirement to submit certified payrolls electronically to the DLSE does not replace the requirement for contractors to submit payrolls to the City of Redlands.

Contact the City of Redlands regarding any questions you may have regarding the new requirements for contractor registration or online submission of certified payroll: (909) 798-7698.

PUBLIC WORKS CONTRACT AWARD INFORMATION (DAS-140)

This is not a request for dispatch of apprentices.

Contract award information must be sent to your Apprenticeship Committee if you are approved to train. If you are not approved to train, you must send the information (which may be this form) to ALL applicable Apprenticeship Committees in your craft or trade in the area of the site of the public work. Go to: **http://www.dir.ca.gov/das/PublicWorksForms.htm** for information about programs in your area and trade. The information shall be provided to the applicable apprenticeship committee within ten (10) days of the date of the execution of the prime contract or subcontract, but in no event later than the first day in which the contractor has workers employed upon the public work.

Do not send this form to the Division of Apprenticeship Standards.

NAME OF YOUR COMPANY	CONTRACTORS STATE LICENSE NO.
MAILING ADDRESS-NUMBER & STREET, CITY, ZIP CODE	AREA CODE & TELEPHONE NO.
NAME AND ADDRESS OF PUBLIC WORKS PROJECT	DATE YOUR CONTRACT WAS EXECUTED
	DATE OF EXPECTED/ACTUAL START OF PROJECT
NAME & ADDRESS OF PUBLIC AGENCY AWARDING CONTRACT	ESTIMATED NUMBER OF JOURNEYMAN HOURS
	OCCUPATION OF APPRENTICE
THIS FORM IS BEING SENT TO: (NAME AND ADDRESS OF APPRENTICESHIP PROGRAM(S)	ESTIMATED NUMBER OF APPRENTICE HOURS
	APPROXIMATE/ACTUAL DATES TO BE EMPLOYED

This is not a request for dispatch of apprentices.

Contractors must make a separate request for actual dispatch, in accordance with Section 230.1(a) California Code of Regulations

Check One of the Boxes Below

1. ☐ We are already approved to train apprentices by the _____ Apprenticeship Committee. We will employ and train under their standards. (Enter name of Committee)

2. ☐ We will comply with the standards of _____ Apprenticeship Committee for the duration of this job only. (Enter name of Committee)

3. ☐ We will employ and train apprentices in accordance with the California Apprenticeship Council regulations, including § 230.1 (c) which requires that apprentices employed on public projects can only be assigned to perform work of the craft or trade to which the apprentice is registered and that the apprentices must at all times work with or under the direct supervision of journeyman/men.

_____
Signature Date

_____
Typed Name

_____
Title

DAS-140 FORM - PUBLIC WORKS CONTRACT AWARD INFORMATION

(Title 8, California Code of Regulations, Section 230)
(California Labor Code, Section 1777.5 (e))

SUBMIT CONTRACT AWARD INFORMATION

Prior to commencing work on a contract for Public Works **every** Contractor shall provide contract award information to the apprenticeship committee for each applicable apprenticeable craft or trade in the area of the site of the public works project that has approved the contractor to train apprentices. Contractors who are not already approved to train by an apprenticeship program sponsor shall provide contract award information to **all** of the applicable apprenticeship committees whose geographic area of operation includes the area of the public works project. This contract award information shall be in writing on a DAS Form 140, Public Works Contract Award Information or a letter which includes the following information:

(1) Contractor's name, address, telephone number and state license number;
(2) The full name and address of the public work awarding agency;
(3) The exact location of the public work site;
(4) Date of the contract award;
(5) Expected start date of the work;
(6) Estimated journeyman hours;
(7) Occupation of Apprentice;
(8) Approximate number of apprentices to be employed; and
(9) Approximate dates apprentices will be employed.

This information shall be provided to the applicable apprenticeship committee within ten (10) days of the date of the execution of the prime contract or subcontract, but in no event later than the first day in which the contractor has workers employed upon the public work.
Failure to provide contract award information, which is known by the awarded contractor, shall be deemed to be a continuing violation for the duration of the contract, ending when a Notice of Completion is filed by the Awarding Body, for the purpose of determining the accrual of penalties under Labor Code Section 1777.7.

THE TOP SECTION OF THE FORM COMPLETELY FILLED OUT will provide the information required pursuant to California Labor Code Section 1777.5 and California Code of Regulations Section 230.1.

LOWER SECTION OF THE FORM Check an appropriate box (#1, 2 or 3) for your status.

In addition to the "ORIGINAL(S)" mailed to all applicable Apprenticeship Committees, a copy of this information shall also be submitted to the City of Redlands.

NOTE: The filing of a DAS 140 is not a request for the dispatch of registered apprentices

CONTRACTOR FRINGE BENEFIT STATEMENT

Project Name:	**Project Location:**	**Today's Date:**
Contractor / Subcontractor Name:	**Business Address:**	

In order that the proper Fringe Benefit rates can be verified when checking payrolls on the above contract, the hourly rates for fringe benefits, subsistence and/or travel allowance payment made for employees by the employer on the various classes of work are tabulated below. **Please Include Apprentice Rates.**

Classification:		**Effective Date:**	**Subsistence or Travel Pay:** $_____
EMPLOYER PAID FRINGE BENEFITS	**Health & Welfare** $_____ hr	**Paid To:** **Name of Plan/Fund/Program:** **Address:**	_____ _____
	Pension $_____ hr	**Paid To:** **Name of Plan/Fund/Program:** **Address:**	_____ _____
	Vacation/Holiday $_____ hr	**Paid To:** **Name of Plan/Fund/Program:** **Address:**	_____ _____
	Training $_____ hr	**Paid To:** **Name of Plan/Fund/Program:** **Address:**	_____ _____
	Other $_____ hr	**Paid To:** **Name of Plan/Fund/Program:** **Address:**	_____ _____

Classification:		**Effective Date:**	**Subsistence or Travel Pay:** $_____
EMPLOYER PAID FRINGE BENEFITS	**Health & Welfare** $_____ hr	**Paid To:** **Name of Plan/Fund/Program:** **Address:**	_____ _____
	Pension $_____ hr	**Paid To:** **Name of Plan/Fund/Program:** **Address:**	_____ _____
	Vacation/Holiday $_____ hr	**Paid To:** **Name of Plan/Fund/Program:** **Address:**	_____ _____
	Training $_____ hr	**Paid To:** **Name of Plan/Fund/Program:** **Address:**	_____ _____
	Other $_____ hr	**Paid To:** **Name of Plan/Fund/Program:** **Address:**	_____ _____

Supplemental statements must be submitted during the progress of the work should there be an increase or change in rates. Use additional sheets as necessary. (Attach a copy of your most recent premium transmittal (including copy of check submitted) into each of the above plans/funds/programs or a letter from the above plans/funds/programs reflecting current payment status).

I certify under penalty of perjury that fringe benefits are paid to the approved plans, funds or programs as listed above.

Print Name and Title	**Signature and Date (Wet Signature Required)**

California
Department of
Industrial Relations

PUBLIC WORKS PAYROLL REPORTING FORM

Page _____ of _____

NAME OF CONTRACTOR:
OR SUBCONTRACTOR:

CONTRACTOR'S LICENSE NO.:
SPECIALITY LICENSE NO.:

ADDRESS:

PAYROLL NO.:

FOR WEEK ENDING:

SELF-INSURED CERTIFICATE NO.:

WORKERS' COMPENSATION POLICY NO.:

PROJECT OR CONTRACT NO.:

PROJECT AND LOCATION:

(1) NAME, ADDRESS AND SOCIAL SECURITY NUMBER OF EMPLOYEE	(2) NO. OF WITH-HOLDING EXEMPTIONS	(3) WORK CLASSIFICATION	(4) DAY	M	T	W	TH	F	S	S	(5) TOTAL HOURS	(6) HOURLY RATE OF PAY	(7) GROSS AMOUNT EARNED		(8) DEDUCTIONS, CONTRIBUTIONS AND PAYMENTS							(9) NET WGS PAID FOR WEEK	CHECK NO.
				DATE									THIS PROJECT	ALL PROJECTS	FED. TAX	FICA (SOC. SEC.)	STATE TAX	SDI	VAC/ HOLIDAY	HEALTH & WELF.	PENSION		
			S	HOURS WORKED EACH DAY																			
															TRAING.	FUND ADMIN	DUES	TRAV/ SUBS.	SAVINGS	OTHER*	TOTAL DEDUC-TIONS		
			O																				
													THIS PROJECT	ALL PROJECTS	FED. TAX	FICA (SOC. SEC.)	STATE TAX	SDI	VAC/ HOLIDAY	HEALTH & WELF.	PENSION		
			S																				
															TRAING.	FUND ADMIN	DUES	TRAV/ SUBS.	SAVINGS	OTHER*	TOTAL DEDUC-TIONS		
			O																				
													THIS PROJECT	ALL PROJECTS	FED. TAX	FICA (SOC. SEC.)	STATE TAX	SDI	VAC/ HOLIDAY	HEALTH & WELF.	PENSION		
			S																				
															TRAING.	FUND ADMIN	DUES	TRAV/ SUBS.	SAVINGS	OTHER*	TOTAL DEDUC-TIONS		
			O																				
													THIS PROJECT	ALL PROJECTS	FED. TAX	FICA (SOC. SEC.)	STATE TAX	SDI	VAC/ HOLIDAY	HEALTH & WELF.	PENSION		
			S																				
															TRAING.	FUND ADMIN	DUES	TRAV/ SUBS.	SAVINGS	OTHER*	TOTAL DEDUC-TIONS		
			O																				

S = STRAIGHT TIME
O = OVERTIME
SDI = STATE DISABILITY INSURANCE

*OTHER – Any other deductions, contributions and/or payments whether or not included or required by prevailing wage determinations must be separately listed. Use extra sheet(s) if necessary

CERTIFICATION **MUST** be completed
(See reverse side)

Form A-1-131 (New 2-80)

Statement of Compliance

Date:_____

I _____, the undersigned, am the _____ with the authority to act for and on
(Print Name) (Position in Business)
behalf of _____ certify under penalty of perjury that the records commencing on _____ and ending on _____ submitted herein and consisting of ____ pages are the originals, full and corrected documents, which depict the payroll record(s) of actual disbursements by way of cash, check, or whatever form to the individual or individuals names,

(1) That this employer has complied with the requirements of the California Labor Code Sections. 1771, 1811, and 1815 for all performed on this public works project, and that the classifications set forth therein for each trade rate conform with the work Performed.
(2) That any apprentices employed in the above period are duly registered to a bona fide apprenticeship program registered with the State of California's Division of Apprenticeship Standards.

PAYROLL/OTHER DEDUCTIONS

1. I herein certify the *full* and complete Prevailing Wages were paid as currently published and posted by the Director of Industrial Relations, State of California and only deductions as authorized under the laws of the State *of* California or the laws of United States of America have been made from these sums.
2. All other deductions are clearly listed for each employee on an attachment as required by the Director of Industrial Relations, State of California.

OPTIONAL BENEFIT PLANS

I herein certify that all employee deductions for benefit plans are authorized and the employee(s) are signed up for the plan(s) and are receiving the benefit(s) of the plan(s) listed.

☐ WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS
In addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above payroll, payment of fringe benefits as listed in the contract have or will be made to the appropriate programs for the benefit of such employees, except as noted below.

☐ WHERE FRINGE BENEFITS ARE PAID IN CASH
Each laborer or mechanic listed in the above payroll has been paid as indicated on the payroll, an amount not less the sum of the applicable basic hourly rate plus the amount of the required fringe benefits as listed in the determination for the craft, except as noted below,

Exception(s)

Craft	Explanation
Craft	Explanation
Craft	Explanation

Remarks

I herein certify under the penalty of perjury all of the above is true and correct as submitted.

Name **Signature**

Date **Payroll #**

CONTRACTOR INFORMATION SHEET

Job Name: _____ Category: _____

Prime Contractor: _____

Subcontractor: _____ License#: _____

Address: _____

Phone #: _____ Payroll Report Contact: _____

Email Address: _____

Fax #: _____ Contract Amount: _____

Estimated Start Date: _____ Estimated End Date: _____

ANTICIPATED TRADES/CLASSIFICATIONS:

_____ _____

_____ _____

_____ _____

SUB-CONTRACTORS (if applicable)

Name: License #: Phone/ Fax #: Contact:

_____

_____

_____

APPENDIX B
CITY OF REDLANDS
WORKDAY CONSTRUCTION SCHEDULE

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CITY OF REDLANDS

MUNICIPAL UTILITIES AND ENGINEERING DEPARTMENT

2025

APPENDIX B

CONSTRUCTION WORKDAY CALENDAR

JANUARY

S	M	T	W	T	F	S
			1 1	2 2	3 3	4 4
5 5	6 6	7 7	8 8	9 9	10 10	11 11
12 12	13 13	14 14	15 15	16 16	17 17	18 18
19 19	20 20	21 21	22 22	23 23	24 24	25 25
26 26	27 27	28 28	29 29	30 30	31 31	

FEBRUARY

S	M	T	W	T	F	S
						1 32
2 33	3 34	4 35	5 36	6 37	7 38	8 39
9 40	10 41	11 42	12 43	13 44	14 45	15 46
16 47	17 48	18 49	19 50	20 51	21 52	22 53
23 54	24 55	25 56	26 57	27 58	28 59	

MARCH

S	M	T	W	T	F	S
						1 60
2 61	3 62	4 63	5 64	6 65	7 66	8 67
9 67	10 69	11 70	12 71	13 72	14 73	15 74
16 75	17 76	18 77	19 78	20 79	21 80	22 81
23 82	24 83	25 84	26 85	27 86	28 87	29 88
30 89	31 90					

APRIL

S	M	T	W	T	F	S
		1 91	2 92	3 93	4 94	5 95
6 96	7 97	8 98	9 99	10 100	11 101	12 102
13 103	14 104	15 105	16 106	17 107	18 108	19 109
20 110	21 111	22 112	23 113	24 114	25 115	26 116
27 117	28 118	29 119	30 120			

MAY

S	M	T	W	T	F	S
				1 121	2 122	3 123
4 124	5 125	6 126	7 127	8 128	9 129	10 130
11 131	12 132	13 133	14 134	15 135	16 136	17 137
18 138	19 139	20 140	21 141	22 142	23 143	24 144
25 145	26 146	27 147	28 148	29 149	30 150	31 151

JUNE

S	M	T	W	T	F	S
1 152	2 153	3 154	4 155	5 156	6 157	7 158
8 159	9 160	10 161	11 162	12 163	13 164	14 165
15 166	16 167	17 168	18 169	19 170	20 171	21 172
22 173	23 174	24 175	25 176	26 177	27 178	28 179
29 180	30 181					

JULY

S	M	T	W	T	F	S
		1 182	2 183	3 184	4 185	5 186
6 187	7 188	8 189	9 190	10 191	11 192	12 193
13 194	14 195	15 196	16 197	17 198	18 199	19 200
20 201	21 202	22 203	23 204	24 205	25 206	26 207
27 208	28 209	29 210	30 211	31 212		

AUGUST

S	M	T	W	T	F	S
					1 213	2 214
3 215	4 216	5 217	6 218	7 219	8 220	9 221
10 222	11 223	12 224	13 225	14 226	15 227	16 228
17 229	18 230	19 231	20 232	21 233	22 234	23 235
24 236	25 237	26 238	27 239	28 240	29 241	30 242
31 243						

SEPTEMBER

S	M	T	W	T	F	S
	1 244	2 245	3 246	4 247	5 248	6 249
7 250	8 251	9 252	10 253	11 254	12 255	13 256
14 257	15 258	16 259	17 260	18 261	19 262	20 263
21 264	22 265	23 266	24 267	25 268	26 269	27 270
28 271	29 272	30 273				

OCTOBER

S	M	T	W	T	F	S
			1 274	2 275	3 276	4 277
5 278	6 279	7 280	8 281	9 282	10 283	11 284
12 285	13 286	14 287	15 288	16 289	17 290	18 291
19 292	20 293	21 294	22 295	23 296	24 297	25 298
26 299	27 300	28 301	29 302	30 303	31 304	

NOVEMBER

S	M	T	W	T	F	S
						1 305
2 306	3 307	4 308	5 309	6 310	7 311	8 312
9 313	10 314	11 315	12 316	13 317	14 318	15 319
16 320	17 321	18 322	19 323	20 324	21 325	22 326
23 327	24 328	25 329	26 330	27 331	28 332	29 333
30 334						

DECEMBER

S	M	T	W	T	F	S
	1 335	2 336	3 337	4 338	5 339	6 340
7 341	8 342	9 343	10 344	11 345	12 346	13 347
14 348	15 349	16 350	17 351	18 352	19 353	20 354
21 355	22 356	23 357	24 358	25 359	26 360	27 361
28 362	29 363	30 364	31 365			

City Holiday

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CITY OF REDLANDS

MUNICIPAL UTILITIES AND ENGINEERING DEPARTMENT

2026

APPENDIX B

CONSTRUCTION WORKDAY CALENDAR

JANUARY

S	M	T	W	T	F	S
				1 1	2 2	3 3
4 4	5 5	6 6	7 7	8 8	9 9	10 10
11 11	12 12	13 13	14 14	15 15	16 16	17 17
18 18	19 19	20 20	21 21	22 22	23 23	24 24
25 25	26 26	27 27	28 28	29 29	30 30	31 31

FEBRUARY

S	M	T	W	T	F	S
1 32	2 33	3 34	4 35	5 36	6 37	7 38
8 39	9 40	10 41	11 42	12 43	13 44	14 45
15 46	16 47	17 48	18 49	19 50	20 51	21 52
22 53	23 54	24 55	25 56	26 57	27 58	28 59

MARCH

S	M	T	W	T	F	S
1 60	2 61	3 62	4 63	5 64	6 65	7 66
8 67	9 68	10 69	11 70	12 71	13 72	14 73
15 74	16 75	17 76	18 77	19 78	20 79	21 80
22 81	23 82	24 83	25 84	26 85	27 86	28 87
29 88	30 89	31 90				

APRIL

S	M	T	W	T	F	S
			1 91	2 92	3 93	4 94
5 95	6 96	7 97	8 98	9 99	10 100	11 101
12 102	13 103	14 104	15 105	16 106	17 107	18 108
19 109	20 110	21 111	22 112	23 113	24 114	25 115
26 116	27 117	28 118	29 119	30 120		

MAY

S	M	T	W	T	F	S
					1 121	2 122
3 123	4 124	5 125	6 126	7 127	8 128	9 129
10 130	11 131	12 132	13 133	14 134	15 135	16 136
17 137	18 138	19 139	20 140	21 141	22 142	23 143
24 144	25 145	26 146	27 147	28 148	29 149	30 150
31 151						

JUNE

S	M	T	W	T	F	S
	1 152	2 153	3 154	4 155	5 156	6 157
7 158	8 159	9 160	10 161	11 162	12 163	13 164
14 165	15 166	16 167	17 168	18 169	19 170	20 171
21 172	22 173	23 174	24 175	25 176	26 177	27 178
28 179	29 180	30 181				

JULY

S	M	T	W	T	F	S
			1 182	2 183	3 184	4 185
5 186	6 187	7 188	8 189	9 190	10 191	11 192
12 193	13 194	14 195	15 196	16 197	17 198	18 199
19 200	20 201	21 202	22 203	23 204	24 205	25 206
26 207	27 208	28 209	29 210	30 211	31 212	

AUGUST

S	M	T	W	T	F	S
						1 213
2 214	3 215	4 216	5 217	6 218	7 219	8 220
9 221	10 222	11 223	12 224	13 225	14 226	15 227
16 228	17 229	18 230	19 231	20 232	21 233	22 234
23 235	24 236	25 237	26 238	27 239	28 240	29 241
30 242	31 243					

SEPTEMBER

S	M	T	W	T	F	S
		1 244	2 245	3 246	4 247	5 248
6 249	7 250	8 251	9 252	10 253	11 254	12 255
13 256	14 257	15 258	16 259	17 260	18 261	19 262
20 263	21 264	22 265	23 266	24 267	25 268	26 269
27 270	28 271	29 272	30 273			

OCTOBER

S	M	T	W	T	F	S
				1 274	2 275	3 276
4 277	5 278	6 279	7 280	8 281	9 282	10 283
11 284	12 285	13 286	14 287	15 288	16 289	17 290
18 291	19 292	20 293	21 294	22 295	23 296	24 297
25 298	26 299	27 300	28 301	29 302	30 303	31 304

NOVEMBER

S	M	T	W	T	F	S
1 305	2 306	3 307	4 308	5 309	6 310	7 311
8 312	9 313	10 314	11 315	12 316	13 317	14 318
15 319	16 320	17 321	18 322	19 323	20 324	21 325
22 326	23 327	24 328	25 329	26 330	27 331	28 332
29 333	30 334					

DECEMBER

S	M	T	W	T	F	S
		1 335	2 336	3 337	4 338	5 339
6 340	7 341	8 342	9 343	10 344	11 345	12 346
13 347	14 348	15 349	16 350	17 351	18 352	19 353
20 354	21 355	22 356	23 357	24 358	25 359	26 360
27 361	28 362	29 363	30 364	31 365		

City Holiday

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APPENDIX C
PERMITS

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Application for Road / Encroachment Permit

City of Redlands - Municipal Utilities & Engineering Department

Name: _____ Phone: _____

Address: _____ City: _____ Zip: _____

Contractor: _____ USA ID No.: _____

Contractor License No.: _____ Type: _____ Cal OSHA No.: _____

I hereby request permission to construct/install improvements/facilities within the City of Redlands road right-of-way at the following location:

Construction Start Date: _____ Anticipated Completion Date: _____

Development No.: _____ Plan No.: _____

Street Name: _____

Cross Streets: _____

Address: _____

and for the purpose of performing the following work:

_____

_____

Applicant/Agent Signature: _____ Date: _____

In accordance with Plans approved by the Municipal Utilities & Engineering Director and/or the Standard Specifications and Detail Drawings of the City of Redlands for the **quantity and type** of improvements listed below:

SHADED AREA FOR OFFICIAL USE ONLY

_____	EA	Driveway Appr, Res/Comm	$ 49.00	/ EA	=$	_____
_____	SF	Sidewalk	$ 0.09	/ SF	=$	_____
_____	SF	Cross Gutter/Spandrel	$ 0.58	/ SF	=$	_____
_____	LF	Curb & Gutter	$ 2.19	/ LF	=$	_____
_____	LF	Curb/Berm	$ 2.62	/ LF	=$	_____
_____	SF	Asphalt Pavement	$ 0.04	/ SF	=$	_____
_____	SF	Crushed Aggregate Base	$ 0.04	/ SF	=$	_____
_____	EA	Street Light	$ 81.00	/ EA	=$	_____
_____	EA	Traffic Signal - New	$ 2,152.00	/ EA	=$	_____
_____	EA	Traffic Signal - Modification	$ 1,737.00	/ EA	=$	_____
_____	CY	Reinforced Concrete	$ 89.00	/ CY	=$	_____
_____	LF	Storm Drain Pipe	$ 8.00	/ LF	=$	_____
_____	EA	Curb Inlet/Outlet Structures	$ 67.00	/ EA	=$	_____
_____	EA	Storm Drain Manhole/Junction Box	$ 67.00	/ EA	=$	_____
_____	EA	Curb Core	$ 62.00	/ EA	=$	_____
_____	LF	Sewer Main	$ 0.95	/ LF	=$	_____
_____	EA	Sewer Manhole	$ 67.00	/ EA	=$	_____
_____	EA	Sewer Cleanout	$ 134.00	/ EA	=$	_____
_____	EA	Sewer Lateral	$ 67.00	/ EA	=$	_____
_____	LF	Water Main - Potable	$ 1.09	/ LF	=$	_____
_____	LF	Water Main - Non-Potable	$ 1.09	/ LF	=$	_____
_____	EA	Fire Hydrant Assembly	$ 66.00	/ EA	=$	_____
_____	EA	Water Service Lateral	$ 26.00	/ EA	=$	_____
_____	EA	Water Shutdown	$ 67.00	/ EA	=$	_____
_____	EA	Fire Service	$ 58.00	/ EA	=$	_____
_____	LF	Excavation/Utility Trench	$ 1.25	/ LF	=$	_____
_____	SF	Street Patch	$ 0.67	/ SF	=$	_____
_____	SF	Warranty Fee (Street Cut)	$ _____	/ SF	=$	_____
_____		_____	$ _____	/	=$	_____
_____		_____	$ _____	/	=$	_____

SUBTOTAL PERMIT FEE $ _____

PERMIT FEE — work complete within specified date from issuance = $ 219.00 fee. **$219.00**

PENALTY FEE 25% of total permit fee if issued after commencement of work ($250.00 minimum fee) $ _____

(Effective 06/02/09) **TOTAL ENCROACHMENT PERMIT FEE** $ _____

Truck Route Permit Required: ☐ YES ☐ NO

Closure Permit With Traffic Plan Required: ☐ YES ☐ NO

Water Shutdown Required: ☐ YES ☐ NO

Bond Required: ☐ YES ☐ NO

Conduit Material: _____

Conduit Size: _____

Calculated By
Inspected by
Municipal Utilities & Engineering
Approved By

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APPENDIX D
Contractor Safety Program

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CONTRACTOR SAFETY PROGRAM

Rev. July 2024

TABLE OF CONTENTS

I. POLICY 3

II. AUTHORITY 3

III. SCOPE 3

IV. DEFINITIONS 3

V. RESPONSIBILITIES 4

RISK MANAGEMENT 4
PROJECT MANAGER (CITY) 5
INSPECTOR (CITY) 5
EMPLOYEES (CITY) 5
CONTRACTOR 5
PROJECT SAFETY OFFICIAL 6

VI. PROGRAM 6

SAFETY PREQUALIFICATION QUESTIONNAIRE 6
APPEAL PROCESS 7
CONSTRUCTION PROJECTS (TIER I AND TIER II) 8
INSPECTIONS 9
TRAINING/DOCUMENTATION 9
NON-COMPLIANCE 9
CITY PERSONNEL 9

VII. RECORDKEEPING 10

VIII. ADDITIONAL REFERENCES 10

ACKNOWLEDGMENT OF RECEIPT (A) 11
SAFETY PREQUALIFICATION QUESTIONNAIRE (B) 12
NOTICE OF NONCOMPLIANCE (C) 13
JOB HAZARD ANALYSIS (D) 14
INCIDENT INVESTIGATION FORM (E) 15

I. Policy

The purpose of this Contractor Safety Program ("CSP") is to ensure, as best as reasonably possible, the protection and safety of all persons and property during construction activities undertaken by private contractors on behalf of the City of Redlands ("City"). The City has a comprehensive and structured approach in outsourcing services performed on City facilities by third-party persons and entities ("Contractor(s)"). The first phase of this comprehensive approach includes actively screening Contractors based on safety records, safety performance, and safety compliance. After the qualified Contractor is awarded a contract, the Contractor must then ensure compliance with all local, state, federal and Cal/OSHA regulations applicable to the contracted scope of work, and requirements set forth within this CSP. The Contractor, its agents, and personnel must adhere to the policies and procedures set forth by this CSP and all applicable laws and regulations.

II. Authority

California Code of Regulations, Title 8, Section 336.10 "Determination of Citable Employer"
California Code of Regulations, Title 8
"Greenbook" Standard Specifications for Public Works Construction
Redlands Municipal Code
California Building Code

III. Scope

This CSP applies to all Contractors who provide or render construction or improvement services for City-owned property and facilities.

The Contractor services covered under this CSP include, but are not limited to, the following:

A. New construction;
B. Remodeling;
C. Facility maintenance or repair;
D. Equipment installation or maintenance; and
E. Services (i.e. janitorial, fleet operations, landscaping, etc.)

Consultants/ Professional service providers are exempt from having to submit a Safety Prequalification Questionnaire ("SPQ"), prior to the beginning of work, but they are expected to be compliant with industry best practices with regards to maintaining a safe work environment for their employees and others.

IV. Definitions

A. **Contract –** any written agreement between the City of Redlands and a Contractor, to perform a specified scope of work on City facilities. With respect to this policy, a contract includes, but is not limited to: awarded purchase orders, bids, and/ or project contracts.
B. **Construction Work –** construction, alteration, and/or repair, including painting and decorating.
C. **Contractor –** a person or entity (including all personnel) awarded a contract to perform work on City property or facilities.
D. **D.A.R.T Rate –** Injuries and illnesses severe enough to warrant: Days Away, Restrictions and Transfers. The DART rate is calculated using the following formula: Number of OSHA Recordable injuries and illnesses that resulted in Days Away x 200,000/divided by total hours worked by all employees during the year covered.

E. **Designated Work Area –** an area where it is necessary to restrict or limit entry or access of nonessential personnel or the public. Examples include work areas involving remediation abatement, demolition, excavation, and overheadlifting.
F. **Facilities –** any building or property owned by the City of Redlands.
G. **Hazard –** source or situation with a potential for harm in terms of injury or health, damage to property, damage to workplace environment, or a combination ofthese.
H. **Job Hazard Analysis ("JHA") –** a technique that focuses on job tasks as a way to identify hazards before they occur. It focuses on the relationship between the worker, the task, the tools, and the work environment. The objective is to eliminate the risk or to utilize control measures to reduce the risk.
I. **North American Industry Classification System ("NAICS") –** is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. businesseconomy.
J. **Non-compliance –** any deviation from standards, practices, processes, procedures, regulations etc. that could either directly or indirectly lead to injury or illness, property damage, damage to the workplace environment, or any combination of thesecriteria.
K. **Notice of non-compliance –** form provided to the Contractor by the City alerting the contractor of non-compliance with City specifications, Cal/OSHA regulations, or any other generally accepted safe work practice.
L. **Non-compliant hazardous work condition –** any hazard that is considered to be non-compliant with State or Federal safety and health regulations, City specifications, or any inconsistency with generally accepted work practices.
M. **Personnel –** all Contractor employees, contractors, sub-contractors and agents providedaccess to City property or facilities.
N. **Recordable Incident** – any injury or illness resulting in death, days away from work, restricted work or transfer to another job, medical treatment beyond first aid, or loss of consciousness per OSHA Section 1904.7(a).
O. **Safety Tailgate –** informal safety meeting generally conducted at the job site prior to the commencement of a job or work shift.
P. **Services –** any and all, labor, duties, functions and activities required to be performed by the Contractor under the contract and any subsequent addenda.

V. Responsibilities

RISK MANAGEMENT

A. Update, maintain, and administer this CSP;
B. Maintain centralized records of training, site visit data, written programs, tailgate meetings, permits, and all other necessary contractor related documentation;
C. Provide technical assistance to Engineering personnel;
D. Attend Pre-construction meetings and progress meetings asneeded;
E. Provide assistance on safety inspections as needed;
F. Review safety submittals;
G. Provide guidance on pre-qualification determination; and
H. Provide training to affected city personnel with responsibilities under thisprogram.

PROJECT MANAGER (CITY)

The Project Manager has the authority to delegate any or all portions of this CSP to subordinates, but the Project Manager will be held accountable for their compliance. The Project Manager shall contact Risk Management, as necessary, for assistance in relation to this CSP.

A. Ensure safety hazards are addressed in a timely manner;
B. Communicate safety concerns during pre-construction meetings and progress meetings;
C. Inform impacted employees of construction activities scheduled in their work area;
D. Enforce pre-qualification procedures in bidding process; and
E. Ensure this CSP is properly executed.

INSPECTOR (CITY)

The City of Redlands construction inspector is not a safety professional and will only provide "Notice of Non-Compliance" for obvious and serious non-compliant conditions.

A. To the best of their abilities, inspect work sites for safety hazards;
B. Communicate safety concerns to Contractor;
C. Provide Contractor with "Notice of Non-Compliance" when serious conditions occur or repeat violations;
D. Collect documentation needed for construction worksites;
E. Submit documentation to Risk Management for recordkeeping;
F. Maintain photo documentation of safety hazards;
G. Never enter situations that can harm or endanger himself/herself;
H. Never use personal protective equipment (PPE) or enter situations, which they are not trained for;
I. Contact Emergency Medical Services (911) and Risk Management in case of emergency; and
J. Attend and communicate safety concerns in progress meetings.

EMPLOYEES (CITY)

A. Immediately notify the Project Manager, inspector, or Risk Management of any safety related concerns at a Contractor job site; and
B. Contact Emergency Medical Services (911) and Risk Management in case of emergency.

CONTRACTOR

Where relevant and applicable, the Contractor's responsibilities shall include:

A. Compliance with requirements and responsibilities detailed within the Contractor Safety Program;
B. Ensure all local regulatory requirements are met and all necessary permits are obtained before conducting work on behalf of the City;
C. Designate a Project Safety Official by name who shall always be available to abate safety hazards;
D. Ensure all personnel have the appropriate qualifications and training to perform the contracted work (Copies of current training documentation and certifications must be on file with the City);
E. Inform City Project Manager or inspector of any job site safety hazards or concerns;
F. Inform City Project Manager if any suspected asbestos-containing material is located;
G. Conduct and submit Job Hazard Analysis (JHA) before work and as required by change of tasks;
H. Conduct and submit Safety Tailgates on a bi-weekly basis;
I. Provide all required PPE necessary to conduct work safely and in accordance with required local regulations;
J. The safety of all individuals who enter work site;
K. Spill cleanup;
L. Immediately report any incidents, accidents, near misses, unsafe conditions, or unsafe acts involving any jobsite personnel;

M. Arrange for the proper storage and removal of waste generated prior to the completion of job, and provide confirmation that the materials have been removed or disposed of in a manner compliant with all applicable environmental regulations;
N. Removing all equipment used during work activities and ensuring proper housekeeping of designated work area at the end of each workday and upon completion of the job;
O. Contact Emergency Services (911) and Project Manager in the event of an emergency; and
P. For the actions of their subcontractors, as they may pertain to this CSP, including their adherence to its contents and review of this document.

PROJECT SAFETY OFFICIAL (CONTRACTOR)

A. Shall always be at the work site;
B. Must be thoroughly familiar with the Contractor's Injury and Illness Prevention Program (IIPP) and Code of Safe Practices;
C. Shall always be available to abate any potential safety hazards; and
D. Shall have the authority and responsibility to shut down an unsafe operation, if necessary.

VI. Program

SAFETY PREQUALIFICATION PROCESS

A. The safety prequalification process is intended to:
   - Provide the City with knowledge of past and current safety performance of Contractors working on City construction projects;
   - Improve Contractor compliance with City safety rules, including safe work practices required by applicable regulations and laws; and
   - Improve safety during Contractor activities.
B. A copy of the SPQ shall be provided to each person or entity bidding on a project, as part of the bidding process.
C. The completed questionnaire shall be returned and reviewed prior to awarding contract work, with supporting information provided as indicated by responses on the questionnaire.
D. The SPQ shall be submitted to 35 Cajon St., Suite 4
   Redlands Ca, 92373
   Attention: Project Name-Contractor Name-SPQ
E. The following criteria and information relating to the Contractor will be reviewed prior to awarding contract:
   - Contractor License;
   - Incident Rates;
   - OSHA Citations;
   - Safety Policies;
   - Safety Programs and Procedures;
   - Compliance History on City Projects; and
   - Certification Statement.
F. Contractor must qualify in each section to be approved for the award of a contract.
G. If a Contractor fails to pass prequalification procedure, the City has the right to disqualify the Contractor's proposal.

H. All costs associated with compliance with City of Redlands prequalification requirements shall be at the sole expense of the Contractor.

I. If a Contractor provides information that is later determined to be false, or improperly withholds information, the Contractor will be immediately disqualified.

J. Any questions or information relating to filing this questionnaire may be answered by reaching:
   - Engineering: (909) 798-7698; or
   - Risk Management: (909) 798-7514

DISQUALIFICATION APPEAL PROCESS

This provision is established pursuant to Public Contract Code section 20101(d) which requires every public agency that requires prospective bidders to prequalify pursuant to the law to establish "a process that will allow prospective bidders to dispute their proposed prequalification rating prior to selection of an alternate bidder." If the City intends to disqualify a bidder based upon the bidder's safety record, the City will notify the bidder in writing and provide the bidder with any supporting evidence that has been received from others or adduced because of an investigation by the City. The notice of intention shall be sent by certified mail with return receipt requested or by overnight mail via a delivery service that provides online tracking which identifies the date of the prospective bidder's receipt of the notice, and shall include notice that the bidder has the right to, and may request a hearing to rebut any evidence used as a basis for disqualification and to present evidence to the City as to why the prospective bidder should be found qualified. Requests for a hearing must be made by written request to the City within ten calendar days of the date of the prospective bidder's receipt of the City's notice of intention. If the bidder does not request a hearing within the time allowed, the City's determination shall stand unchallenged and become final.

Within seven calendar days of receiving the bidder's request for a hearing, the City shall notify the bidder in writing of the date, time and place of the hearing. The hearing shall be held no sooner than ten (10) calendar days and no later than fifteen (15) calendar days after the notice is given. The notice shall inform the bidder of its right to present testimony and documents in support of its position.

The hearing shall be conducted before the Redlands City Manager, which may be continued from time to time as reasonably determined by the City Manager but shall not exceed forty five (45) days. At the conclusion of the hearing, and after considering all testimony and documentation presented, the City Manager shall issue a written decision no later than five calendar days following the hearing. The City Manager's decision shall be final and is not subject to further appeal to the City.

The bidder shall not be entitled to bid on any contracts with the City until it has met the safety pre-qualification standards. If the City Manager approves an appeal, the contractor will have been deemed to meet the qualification standards and it will be valid for one year. The bidder shall have the right to withdraw its application for prequalification or its appeal at any time before the City Manager's decision becomes final. Such withdrawal will not preclude the bidder from re-applying for prequalification.

CONSTRUCTION PROJECTS

A. After a contract is awarded, the Contractor shall maintain, throughout the duration of the project, safety measures as necessary to protect the public and workers within, or in the vicinity of, the designated work zone. This includes an evaluation of the work to be performed and the hazards likely to be encountered. Contractors are expected to follow, at a minimum, all pertinent laws, rules, and regulations for the location in which they will be working. Where applicable, Contractor Safety Programs will meet or exceed City programs/ procedures and are subject to review and approval by the City prior to contract execution.

B. Job Hazard Analysis ("JHA")
    1. Prior to a notice to proceed a JHA must be completed utilizing the City's form, or equivalent, to assess the hazards present in the designated work area. Any information requested on the City's form, but not stated on the equivalent form utilized, shall be provided separately with the original submission.
    2. All members of the construction unit must sign the JHA to acknowledge hazard abatement procedures.
    3. JHA must be kept at job site accessible to all impacted personnel.
    4. Failure to follow JHA procedures may lead to termination of the contract.
C. Personal Protective Equipment ("PPE")
    1. All required PPE must be always worn during work activities.
    2. All mandatory PPE must be highlighted in the JHA.
    3. The Contractor shall provide PPE.
    4. Failure to follow PPE guidelines may lead to termination of the contract.
D. Safety Tailgates
    1. Safety Tailgate Meetings must be held on a biweekly basis for all construction projects.
    2. The first meeting shall take place on Day 1, Week 1 and every other week thereafter.
    3. Tailgates shall be signed by all personnel and submitted to Construction Inspector for recordkeeping.
    4. Tailgate topics should be specific to the scope of work of the project.
E. Injury Reporting
    1. Contractors shall immediately report injuries or accidents to the Project Manager (regardless of severity). Additionally, contractors are responsible for and must also conduct accident investigations of any injuries that occur on site and provide results to the Project Manager.
    2. Use the City Incident Investigation Form (Attachment E), or equivalent, to meet this requirement.
F. Spill Prevention
    1. The Contractor is responsible for any spill within the confines of the project and those outside of the construction limits caused by the Contractor's defective equipment, containers, or personnel.
    2. Secondary spill containment systems shall be used to prevent contamination of the environment.
G. Construction in Occupied Buildings
    1. When building occupants are present during construction projects additional safeguards must be implemented to eliminate exposures and complaints. Dust/ particulates from demolition, sanding and other construction activities must be controlled by adequate ventilation, or containment and negative air ventilation systems based upon the specific type of activity and particle. Similar controls must be utilized for odorous activities including, but not limited to, carpet adhesive, painting, welding, and coatings.
    2. The Contractor shall ensure that the HVAC system is protected to prevent contamination. If an HVAC system is unprotected and contaminated by any construction/demolition materials, the Contractor shall be held responsible for the cost of cleaning the system and any subsequent repairs therein.
    3. Negative air ventilation systems shall have appropriate filtration and be exhausted outside of the building.

INSPECTIONS

A. Follow-up inspections will be executed to enforce compliance with safety and health requirements.
B. Follow-up inspections will be conducted as part of routine site inspections by construction inspector and Risk Management employees.

C. The SPQ aims to provide the City with knowledge of Contractor safety history and safety practices. This minimizes the need for an increased frequency of inspections. In addition, the City will take the following guidelines into consideration when determining the frequency of inspections.
    1. Scale of project;
    2. The frequency with which the number and types of hazards change as the work progresses;
    3. More frequent inspections will be implemented in the beginning of the project; and
    4. When the Contractor has never worked for the City.

TRAINING/DOCUMENTATION

A. The contractor will ensure that all personnel are trained for the scope of work they are assigned, as well as the equipment they will be utilizing.
B. Documentation shall be on file with the City prior to project start.
C. Personnel missing training documentation shall not be permitted to work on awarded City projects.
D. Training requirements are mandated by Federal and State Regulations. This may include, but is not limited to, the programs listed in the SPQ.

NON-COMPLIANCE

A. Contractor compliance issues shall be documented on the "Notice of Non-Compliance" form. A copy of this form shall be provided to the Contractor for completion.
B. Upon receipt of the completed "Notice of Non-Compliance" form, the Project Manager and Risk Management will evaluate, based on the incident, and identify, as appropriate, any additional corrective and/or preventive actions for completion.
C. If immediate correction is not feasible, the project will be temporarily stopped until the issue is adequately resolved.
D. City staff with authority to stop work are:
    1. Construction Inspector;
    2. City Project Manager;
    3. City Manager; and
    4. Risk Management staff.
E. Any violation or deviation from safety rules, procedures, or regulations, based on evaluation, may be subject to all disciplinary actions listed as follows:
    1. Verbal warning
    2. Written warning-Notice of Non-Compliance (work may not continue until approved corrections are implemented);
    3. Dismissal of non-complying personnel; and/or
    4. Termination of Contract.

The City of Redlands maintains the right to terminate any contract for the violation of safety issues without liability to the City.

CITY PERSONNEL

A. All affected City employees will be informed in advance of any construction related work or other contract work which has the potential for impacting their workplace. Notifications will be made to all affected employees via e-mail or written memo by the Project Manager or designee. Notifications must include the following information:
    1. Start and end dates of the work to be completed;
    2. Work areas to be affected;

3. Description of work to be completed;
4. Name and phone number of Project Manager;
5. Name and phone number of Construction Inspector; and
6. Name and phone number of Risk Management.

B. Employees should be instructed to notify the Project Manager regarding logistical issues or other concerns. Safety and Health concerns should be directed to either the Project Manager, Inspector, or Safety Specialist.

VII. Recordkeeping

The City's Human Resources / Risk Management Department will maintain all records prepared in association with this CSP, with copies also place on file with the office of the City Clerk.

VIII. Additional References

https://www.dir.ca.gov/title8/336_10.html

City of Redlands
Acknowledgment of Receipt Statement

I acknowledge by signing this document, that I have received and reviewed the City of Redlands' Contractor Safety Program and understand that it contains valuable information on the City's policies and procedures regarding employee safety as it pertains to Contractor activities. Furthermore, I acknowledge that failure to comply with any of these procedures may lead to termination of the contract with the City.

Contractor Signature	Contractor Title:
Contractor Name (Print)	Date Signed

If you have any questions regarding this document, please contact the Risk Management Division at (909) 798-7514.

CITY OF REDLANDS
SAFETY PREQUALIFICATION QUESTIONNAIRE

Omitting or reporting false information on this questionnaire may result in disqualification of bid. The City of Redlands reserves the right to conduct random or for-cause audits of information stated in this questionnaire. If deemed necessary, additional documentation may be requested by the City to verify responses on this questionnaire.

SECTION 1 – GENERAL INFORMATION

Company Name:	
Contractor License #:	Expiration Date:
Address:	
City:	State: Zip Code:
Name of Person Submitting Application:	
Title:	Telephone #:
Email Address:	
Identify the highest-ranking Safety/Health Professional in your Company:	
Name:	
Title:	Telephone #:

SECTION 2 – INCIDENT RATES & WORKER'S COMPENSATION INFORMATION

INCIDENT RATES Provide your actual injury and illness data below:	Provide the NAICS Code Number that best represents your Firm:_____ Provide any additional numbers here:_____

(Provide three full years of data)	Last Calendar	2 Years Ago	3 Years Ago
Number of hours worked by all employees:			
Total Recordable Incident Rate*:			
D.A.R.T. Rate*:			
Total Number of Fatalities:			

Incident Rate = [(Total Recordable Cases X 200,000 hours)/ Number of hours worked by all employees]

D.A.R.T. Rate = [(Total Number of entries for Days Away, Restricted and Job Transfer X 200,000 hours)/ Number of hours worked by all employees]

If your latest incident rates and D.A.R.T. rates are greater than 100% of the industry average for all your NAICS code Numbers Listed, your bid may be disqualified.

The industry average can be found at www.bls.gov

WORKERS' COMPENSATION INFORMATION

1. Provide your Workers' Compensation Experience Modification Rate (EMR) Data:

	Policy Year	EMR
Current EMR*		
1 Year Ago:		
2 Years Ago:		
3 Years Ago:		

* If your current EMR is greater than 1.25, initialing here certifies that you will provide a competent, full- time person or representative responsible for safety for all City projects:_____

* Initialing here certifies that your firm does not have an EMR:_____
(Submit a copy of your firm's Loss Run Reports for the last three years if your firm does not have an EMR.)

Name of your firm's Workers' Compensation carrier:

Phone Number of Workers' Compensation carrier

2. Is your firm self-insured for Workers' Compensation claims?	Yes ❒	No ❒
If yes, please attach a copy of the latest Annual Report to the State of California Department of Industrial Relations and/or State of California Certificate of Self-Insurance.)		

SECTION 3– CITATION HISTORY

1. Has your firm received any regulatory citations in the last threeyears?	Yes ❒	No ❒
If yes, please answer the question below.		

2. Were any of the confirmed (Closed) citations classified as Serious, Willful, Repeat, or Failure to abate?	Yes ❒	No ❒
3. If yes, please explain:		
4. Have you abated all the citations issued to you in the last three years	Yes ❒	No ❒
If no, please explain abatement action plan:		

SECTION 4 – SAFETY POLICIES

	Questions (Please check YES or NO)	YES	NO*
1.	Does your company provide and adhere to a written Illness Prevention Program (IIPP) (CCR Title 8 §3203(a))? If yes, a copy of the program will be required on-hand at the job site throughout the duration of the contract. Please attach a copy to your bid proposal.	☐	☐
2.	Does your company provide and conduct Tailgate Meetings or equivalent with employees at least every 10 working days? (CCR Title 8 §1509(e))	☐	☐
3.	Does your company have a policy for disciplinary action for unsafe behavior ensuring employee compliance with safe and healthy work practices? (CCR Title 8 §3203(a)(2))	☐	☐
4.	Does your company provide and abide by a written Code of Safe Practices that relates to your firm's operations. (CCR Title 8 §1509(b)) If yes, a copy of the Code of Safe Practices will be required on-hand at the job site throughout the duration of the contract. Please attach a copy with your bid proposal.	☐	☐
5.	Does your company perform JHAs? (CCR Title 8 §1511(b)	☐	☐
6.	Does your company provide training and retraining programs for ensuring employee compliance with safe and healthy work practices? (CCR Title 8 §3203 (a)(2), (a)(7)	☐	☐
7.	Does your company provide training and retraining programs for ensuring employee compliance	☐	☐

*Please provide reason(s) for NO answer in the box below or on a separate sheet of paper.

Failure to provide the above-referenced documents will result in the contractor's bid being disqualified.

SECTION 5 – SAFETY PROGRAMS AND PROCEDURES

PLEASE ANSWER ALL QUESTIONS BY CHECKING YES OR NO, AND ATTACHING APPROPRIATE DOCUMENTS THAT MAY APPLY OR AS REQUESTED.

		YES	NO
1.	**Is Confined Space work anticipated in the scope of the work awarded? (If no, please proceed to Question 2)**	☐	☐
	If yes, please attach the following:	Attached?	
	Copy of written Confined Space Entry Procedure	☐	☐
	List of personnel authorized on jobsite to work in confined space(s)	☐	☐
	List of personnel authorized on jobsite to serve as Rescue Team	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐
2.	**Is work requiring Lockout/Tagout protocols anticipated in the scope of the work awarded? (If no, please proceed to Question 3)**	☐	☐
	If yes, please attach the following:	Attached?	
	Copy of written Lockout/Tagout (LOTO) Procedure	☐	☐
	List of personnel authorized on jobsite to perform LOTO	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐
3.	**Is work requiring a personal lift anticipated in the scope of the work awarded? (If no, please proceed to Question 4)**	☐	☐
	If yes, please attach the following:	Attached?	
	List of personnel authorized on jobsite to use lifts	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐
4.	**Is work requiring a forklift anticipated in the scope of the work awarded? (If no, please proceed to Question 5)**	☐	☐
	If yes, please attach the following:	Attached?	
	List of personnel authorized on jobsite to use a forklift	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐
5.	**Is work requiring a crane anticipated in the scope of the work awarded? (If no, please proceed to Question 6)**	☐	☐
	If yes, please attach the following:	Attached?	
	Copy of written Crane Program	☐	☐
	Copy of all expected Crane operators' Certifications	☐	☐
	List of personnel designated as Competent under Crane program	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

NOTE: If awarded bid, more documentation may be required

6.	**Is Hot Work (as defined by OSHA) anticipated in the scope of the work awarded? (If no, please proceed to Question 7)**	☐	☐
	If yes, please attach the following:	Attached?	
	Copy of written Hot Work Procedure	☐	☐
	List of personnel authorized on jobsite to perform Hot Work	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

7.	**Is Trenching/ Excavation work anticipated in the scope of the work awarded? (If no, proceed to Question 8)**	☐	☐
	Is a plan in place for the disposal of all material that cannot be returned to the trench/ excavation?	☐	☐
	Are appropriate materials for barricading or securing work area at jobsite?	☐	☐
	Has a permit from the Department of Industrial Relations for excavations deeper than 5 feet been obtained?	☐	☐
	If yes, please attach the following:	Attached?	
	Copy of written Trenching/ Excavation Procedure	☐	☐
	Copy of Permit if trench is to exceed depth of 5 feet	☐	☐
	List of personnel designated as Competent under Trenching/ Excavation Program	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

NOTE: If awarded bid, more documentation may be required

8.	**Is electrical work anticipated in the scope of the work awarded? (If no, proceed to Question 9)**	☐	☐
	If yes, please attach the following:	Attached?	
	Copy of written Electrical Safety Program	☐	☐
	List of personnel designated as Competent under Electrical Safety Program	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

9.	**Is work that may have an arc flash potential anticipated in the scope of the work awarded? (If no, proceed to Question 10)**	☐	☐
	Are all materials required to safely perform arc flash present?	☐	☐
	If yes, please attach the following:	Attached?	
	Copy of Arc Flash Procedure	☐	☐
	List of personnel designated as Competent under Arc Flash Program	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

10.	**Is work involving chemicals anticipated in the scope of the work awarded? (If no, proceed to Question 11)?**	☐	☐
	If yes, please attach the following:	Attached?	
	Copy of written Hearing Conservation Program	☐	☐
	List of personnel working in high noise areas	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

11.	**Is work involving chemicals anticipated in the scope of the work awarded? (If no, proceed to Question 12)?**	☐	☐
	* Copies of SDS for Chemicals used must be kept at jobsite		
	Please attach the following:	Attached?	
	Copy of written Hazard Communication Program	☐	☐
	List of personnel performing work with chemicals	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐
	List trade names of all hazardous materials which you will be using on site:		

12.	**Is work on or adjacent to public roadways anticipated in the scope of the work awarded? (If no, proceed to Question 13)**	☐	☐
	Do you have the appropriate provisions (signs, devices, barricades/)	☐	☐
	Please attach the following:	Attached?	
	Please provide a list of personnel working in traffic areas.	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

NOTE: If awarded bid, more documentation may be required

13.	**Is it anticipated in the scope of the work awarded that exposure to asbestos is possible? (If no, proceed to Question 14)**	☐	☐
	Please attach the following:	Attached?	
	Copy of written procedure(s)	☐	☐
	List of personnel working with potential exposure to asbestos	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

14.	**Is it anticipated in the scope of the work awarded that exposure to silica is possible? (i.e. sandblasting, concrete demolition, concrete saw cutting, surface grinding, etc.) (If no, proceed to Question 15)**	☐	☐
	Please attach the following:	Attached?	
	Copy of Silica Control Plan	☐	☐
	List of personnel working with potential exposure to silica	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

15.	**Is work at heights anticipated in the scope of the work awarded? (If no, proceed to Question 16)**	☐	☐
	Please attach the following:	Attached?	
	Copy of written Fall Protection Program	☐	☐
	List of personnel designated as Competent under Fall Protection Program	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

16.	**Is work requiring the use of respirators anticipated in the scope of the work awarded? (If no, proceed to Question 17)**	☐	☐
	Please attach the following:	Attached?	
	Copy of written Respiratory Protection Program	☐	☐
	List of personnel using respirators	☐	☐
	Verification of personnel training (copies of certs, cards, etc.)	☐	☐

17.	**If the scope of work to be performed is not adequately represented by questions (1-16), please list any additional Health & Safety concerns below.**

SECTION 6 – COMPLIANCE HISTORY ON CITY PROJECTS

In addition to the previous sections, Contractors that have previously been awarded work by the City, will be equally evaluated on their compliance history in relation to City projects.

SECTION 7 – CERTIFICATION STATEMENT

I Certify under penalty of perjury that:

a. the information contained herein is true and correct to the best of my knowledge, and

b. no attempt has been made to give false or misleading information or to withhold any information.

Signature of Authorized Representative:	Title of Authorized Representative
Printed Name of Authorized Representative	Date Signed:

NOTICE OF NON-COMPLIANCE

Project: _____

Contractor: _____

Notice of Non-Compliance was issued to Contractor's representative, _____,
Name

on _____ at _____.

The following unsafe behaviors were observed at the Contractor's job site:

_____
_____
_____
_____
_____
_____
_____

If the unsafe condition is not immediately corrected, the City of Redlands may take disciplinary action in accordance with the Contractor Safety Program guidelines.

_ _

To be completed by Contractor

Corrective action plan to abate hazards:

_____
_____
_____
_____
_____
_____

Unsafe Condition Resolved: Date: _____ Time: _____

Remarks:

_____
_____
_____
_____
_____
_____

Job Hazard Analysis

Project:			
Company:	Project Safety Official:	Project Manager (City):	
Scope of Work:		Location:	Date:

Tasks	Potential Safety Risks/Hazards	Safety Controls/Mitigate	Required PPE
			☐ Hard Hat ☐ Safety Vest ☐ Safety Glasses/Goggles ☐ Safety Boots ☐ Respirator ☐ Safety Gloves ☐ Face Shield ☐ Fall Protection ☐ Other: _____ _____ _____ _____

Signatures of Employees On-Site this JHA is applicable to:

Employee Signature:	**Print Name:**	**Date:**

INCIDENT INVESTIGATION FORM

Date of Incident:	Time of Incident:	Date Reported:
Lead Investigator:	Contact Information:	
Contractor:	Employee Name:	
Witness 1 Name:	Telephone:	
Witness 2 Name:	Telephone:	
Incident Site/ Location		
Incident Summary:		
Near Miss Yes No	Incident Severity: Minor Significant Major Critical	
Root Cause(s):		
Corrective Actions:		

City Council Meeting **J. 5.**

DATE: 10/21/2025

TO: Honorable Mayor and City Council Members

SUBJECT: Consideration of a sole source Professional Services Agreement with Civil & Environmental Consultants, Inc. for engineering design and permitting services for the site integration of an ultra-low emissions flare at the California Street Landfill and Wastewater Treatment Plant in an amount not-to-exceed $268,200 (Facilities and Community Services Director Crocker)

MOTION(S):

If the City Council determines that staff's recommendation is appropriate, the following motion is provided:

1. "I move that City Council approve the sole source Professional Services Agreement with Civil & Environmental Consultants, Inc. in an amount not-to-exceed $268,200."

RECOMMENDATION:

Staff recommends City Council approve the sole source Professional Services Agreement with Civil & Environmental Consultants, Inc. for engineering design and permitting services for the site integration of an ultra-low emissions flare at the California Street Landfill and Wastewater Treatment Plant in an amount not-to-exceed $268,200.

DISCUSSION:

The Facilities and Community Services Department, Solid Waste Division, operates the California Street Landfill (CSL) and its' actual day-to-day operations. It is an active Class III landfill regulated by various state entities that permit and monitor the site's daily operations.

The existing landfill gas flare system at the California Street Landfill and Wastewater Treatment Plant is over 25 years old and has become challenging to

meet current operational and regulatory standards. To ensure compliance and improve efficiency, the City has initiated the procurement process for a new landfill gas blower skid and ultra-low emissions flare. This replacement system will ensure the City remains in full regulatory compliance.

In addition to the flare procurement, it is necessary to have a company provide engineering design and permitting services for the site integration of the ultra-low emissions flare. The project involves highly specialized technical requirements and strict regulatory compliance. Civil & Environmental Consultants, Inc. (CEC) has been essential in ensuring that the selected flare will be properly integrated and that regulatory compliance will be maintained. CEC's role has expanded to include detailed analysis of gas production projections, flare sizing, and establishing the operational parameters necessary to meet the South Coast Air Quality Management District (SCAQMD) permit conditions.

The SCAQMD permit directly influences the City's selection of the flare provider, and the City chose the John Zink Hamworthy Combustion system to minimize revisions to the approved permit. CEC has been involved in every stage of the permit review, beginning in 2024 when the City received the Permit to Construct a replacement flare from the SCAQMD. They have also been involved in the system design and regulatory coordination, allowing them to possess unique knowledge of the site-specific conditions, permitting requirements, and technical specifications.

Staff has determined that CEC's continued involvement and approval of the sole source agreement are essential, as they are uniquely qualified to ensure the selected flare is properly integrated, the project stays on schedule, and regulatory compliance is maintained.

ALTERNATIVES:

City Council may elect not to approve the sole source agreement for engineering design and permitting services and provide alternative direction to staff.

STRATEGIC PLAN:

Supports Priority D- Sustainability.

SUBMITTED BY:
Tabitha Crocker, Facilities and Community Services Director

RECOMMENDED BY:
Charles M. Duggan Jr., City Manager

REVIEWED BY:
Yvette M. Abich Garcia, City Attorney
Janice McConnell, Assistant City Manager
Christopher Boatman, Assistant City Manager
Danielle Garcia, Management Services/Finance Director
Dana Abramovitz-Daniel, Procurement Manager

PREPARED BY:
Nathalie Ayala, Senior Administrative Assistant

Fiscal Impact

Fiscal Year:	FY 2025-26
Revenue Generating:	No
Appropriation Required Y/N:	N
Amount:	$268,200
Budgeted Y/N:	Y
Account No.:	511910

Discussion:

Sufficient funding for the purchase order is included in the Solid Waste Division's (511910) project budget for Fiscal Year 2025-26 as approved by City Council.

Attachments

B. Professional Services Agreement

C. Single Sole Source Documents

AGREEMENT TO PERFORM PROFESSIONAL SERVICES

This agreement for the provision of engineering design and permitting services for the site integration of an ultra-low emissions flare at the California Street Landfill and Wastewater Treatment Plant ("Agreement") is made and entered in this 21st day of October, 2025 ("Effective Date"), by and between the City of Redlands, a municipal corporation ("City") and Civil & Environmental Consultants, Inc. a Pennsylvania corporation ("Consultant"). City and Consultant are sometimes individually referred to herein as a "Party" and, together, as the "Parties." In consideration of the mutual promises contained herein, City and Consultant agree as follows:

ARTICLE 1 – ENGAGEMENT OF CONSULTANT

1.1 City hereby engages the Consultant to provide engineering design and permitting services for the site integration of an ultra low emissions flare at the California Street Landfill and Wastewater Treatment Plant services for City (the "Services").

1.2 The Services shall be performed by the Consultant in a professional manner, and Consultant represents that it has the skill and the professional expertise necessary to provide the Services to City at a level of competency presently maintained by other practicing professional consultants in the industry providing like and similar types of Services.

ARTICLE 2 – SERVICES OF CONSULTANT

2.1 The Services that Consultant shall perform are more particularly described in Exhibit "A," titled "Scope of Services," which is attached hereto and incorporated herein by this reference.

2.2 Consultant shall comply with applicable federal, state and local laws and regulations in the performance of this Agreement including, but not limited to, any applicable State prevailing wage laws.

ARTICLE 3 – RESPONSIBILITIES OF CITY

3.1 City designates Tabitha Crocker, Facilities and Community Services Director, as City's representative with respect to performance of the Services, and such person shall have the authority to transmit instructions, receive information, interpret and define City's policies and decisions with respect to performance of the Services.

ARTICLE 4 – PERFORMANCE OF SERVICES

4.1 Consultant shall perform and complete the Services in a prompt and diligent manner in accordance with the schedule set forth in Exhibit "B," titled "Project Fee Schedule," which is attached hereto and incorporated herein by reference.

4.2 The term of this Agreement shall be for a period of one (1) year commencing as of the Effective Date, unless terminated earlier as provided herein.

4.3 If Consultant's Services include deliverable electronic visual presentation materials, such materials shall be delivered in a form, and made available to City, consistent with City Council-adopted policy for the same. It shall be the obligation of the Consultant to obtain a copy of such policy from City staff.

ARTICLE 5 – PAYMENTS TO CONSULTANT

5.1 Total compensation for Consultant's performance of the Services shall be in the amount of two hundred sixty-eight thousand dollars ($268,200). City shall pay Consultant in accordance with Exhibit "B," titled "Project Fee Schedule" which is attached hereto and incorporated herein by this reference.

5.2 Consultant shall submit monthly invoices to City describing the Services performed during the preceding month. Consultant's invoices shall include a brief description of the Services performed, the dates the Services were performed, the number of hours spent and by whom, and a description of reimbursable expenses related to the Services. City shall pay Consultant no later than thirty (30) days after receipt and approval by City of Consultant's invoice.

5.3 Any notice or other communication required, or which may be given, pursuant to this Agreement, shall be in writing. Any such notice shall be deemed delivered (i) on the date of delivery in person; (ii) five (5) days after deposit in first class registered mail, with return receipt requested; (iii) on the actual delivery date if deposited with an overnight courier; or (iv) on the date sent by facsimile or electronic mail transmission (including PDF), if confirmed with a copy sent contemporaneously by first class, certified, registered or express mail; in each case properly posted and fully prepaid to the appropriate address set forth below, or such other address as a Party may provide notice in accordance with this section:

CITY:

City Clerk
City of Redlands
35 Cajon Street
P.O. Box 3005 (mailing)
Redlands, CA 92373
jdonaldson@cityofredlands.org
Phone: (909) 798-7531

CONSULTANT:

Benjamin Arata, Principal
Civil & Environmental Consultants, Inc.
2356 Gold Meadow Way, Suite 120
Gold River, CA 95670
barata@cecinc.com
Phone: (610) 952-0634

ARTICLE 6 – INSURANCE AND INDEMNIFICATION

6.1 The following insurance coverage required by this Agreement shall be maintained by Consultant for the duration of its performance of the Services. Consultant shall not perform any Services unless and until the required insurance listed below is obtained by Consultant. Consultant shall provide City with certificates of insurance and endorsements evidencing such insurance prior to commencement of the Services. Insurance policies shall include a provision prohibiting cancellation or modification of the policy except upon thirty (30) days prior written notice to City.

A. Workers' Compensation and Employer's Liability insurance in the amount that meets statutory requirements with an insurance carrier acceptable to City, or certification to City that Consultant is self-insured or exempt from the workers' compensation laws of the State of California. Consultant shall execute and provide City with Exhibit " ," titled "Workers' Compensation Insurance Certification," which is attached hereto and incorporated herein by this reference, prior to performance of the Services.

B. Comprehensive General Liability insurance with carriers acceptable to City in the minimum amount of One Million Dollars ($1,000,000) per occurrence and Two Million Dollars ($2,000,000) aggregate, for public liability, property damage and personal injury is required. City shall be named as an additional insured and such insurance shall be primary and non-contributing to any insurance or self-insurance maintained by City.

C. Consultant shall secure and maintain professional liability insurance throughout the term of this Agreement in the amount of One Million Dollars ($1,000,000) per claim made and Two Million Dollars ($2,000,000) in the aggregate.

D. Business Auto Liability coverage, with minimum limits of One Million Dollars ($1,000,000) per occurrence, combined single limit bodily injury liability and property damage liability. This coverage shall include all Consultant owned vehicles used in connection with Consultant's provision of the Services, hired and non-owned vehicles, and employee non-ownership vehicles. City shall be named as an additional insured and such insurance shall be primary and non-contributing to any insurance or self-insurance maintained by City.

E. Consultant is expressly prohibited from assigning or subcontracting any of the Services without the prior written consent of City. In the event of mutual agreement by the Parties to assign or subcontract a portion of the Services, Consultant shall add such assignee or subcontractor as an additional insured to the insurance policies required hereby and provide City with the insurance endorsements prior to any Services being performed by the assignee or subcontractor.

6.2 Consultant shall defend, indemnify and hold harmless City and its elected and appointed officials, employees and agents from and against any and all claims, losses or liability, including attorneys' fees, arising from injury or death to persons or damage to property occasioned by any negligent act or omission by, or the willful misconduct of, Consultant, or its officers, employees and agents in performing the Services.

ARTICLE 7 – CONFLICTS OF INTEREST

7.1 Consultant covenants and represents that it does not have any investment or interest in any real property that may be the subject of this Agreement or any other source of income, interest in real property or investment that would be affected in any manner or degree by the performance of Consultant's Services. Consultant further covenants and represents that in the performance of its duties hereunder, no person having any such interest shall perform any Services under this Agreement.

7.2 Consultant agrees it is not a designated employee within the meaning of the Political Reform Act because Consultant:

A. Does not make a governmental decision whether to:

(i) approve a rate, rule or regulation, or adopt or enforce a City law;
(ii) issue, deny, suspend or revoke any City permit, license, application, certification, approval, order or similar authorization or entitlement;
(iii) authorize City to enter into, modify or renew a contract;
(iv) grant City approval to a contract that requires City approval and to which City is a party, or to the specifications for such a contract;
(v) grant City approval to a plan, design, report, study or similar item;
(vi) adopt, or grant City approval of, policies, standards or guidelines for City or for any subdivision thereof.

B. Does not serve in a staff capacity with City and in that capacity, participate in making a governmental decision or otherwise perform the same or substantially the same duties for City that would otherwise be performed by an individual holding a position specified in City's Conflict of Interest Code under Government Code section 87302.

7.3 In the event City determines that Consultant must disclose its financial interests, Consultant shall complete and file a Fair Political Practices Commission Form 700, Statement of Economic Interests, with the City Clerk's office pursuant to the written instructions provided by the City Clerk.

ARTICLE 8 – GENERAL CONSIDERATIONS

8.1 In the event any action is commenced to enforce or interpret any of the terms or conditions of this Agreement the prevailing Party shall, in addition to any costs and other relief, be entitled to the recovery of its reasonable attorneys' fees, including fees for the use of in-house counsel by a Party.

8.2 Consultant shall not assign any of the Services, except with the prior written approval of City and in strict compliance with the terms and conditions of this Agreement. Any

assignment or attempted assignment without such prior written consent may, in the sole discretion of City, result in City's immediate termination of this Agreement.

8.3 Consultant is for all purposes under this Agreement an independent contractor and shall perform the Services as an independent contractor. Neither City nor any its agents shall have control over the conduct of Consultant or Consultant's employees, except as herein set forth. Consultant shall supply all necessary tools and instrumentalities required to perform the Services. Assigned personnel employed by Consultant are for its account only, and in no event shall Consultant or personnel retained by it be deemed to have been employed by City or engaged by City for the account of, or on behalf of City. Consultant shall have no authority, express or implied, to act on behalf of City in any capacity whatsoever as an agent, nor shall Consultant have any authority, express or implied, to bind City to any obligation.

8.4 This Agreement may be terminated by City, in its sole discretion, by providing not less than five (5) days prior written notice to Consultant of City's intent to terminate. If this Agreement is terminated by City, an adjustment to Consultant's compensation shall be made, but (1) no amount shall be allowed for anticipated profit or unperformed Services, and (2) any payment due Consultant at the time of termination may be adjusted to the extent of any additional costs to City occasioned by any default by Consultant. Upon receipt of a termination notice, Consultant shall immediately discontinue its provision of the Services and, within five (5) days of the date of the termination notice, deliver or otherwise make available to City, copies (in both hard copy and electronic form, where applicable) of project related data, design calculations, drawings, specifications, reports, estimates, summaries and such other information and materials as may have been accumulated by Consultant in performing the Services. Consultant shall be compensated on a pro-rata basis for Services completed up to the date of termination.

8.5 Consultant shall maintain books, ledgers, invoices, accounts and other records and documents evidencing costs and expenses related to the Services for a period of three (3) years, or for any longer period required by law, from the date of final payment to Consultant pursuant to this Agreement. Such books shall be available at reasonable times for examination by City at the office of Consultant.

8.6 This Agreement, including the Exhibits incorporated herein by reference, represents the entire agreement and understanding between the Parties as to the matters contained herein, and any prior negotiations, written proposals or verbal agreements relating to such matters are superseded by this Agreement. Except as otherwise provided for herein, any amendment to this Agreement shall be in writing, approved by City and signed by City and Consultant.

8.7 This Agreement shall be governed by and construed in accordance with the laws of the State of California, without regard to its conflicts of laws provisions. The Parties agree that all actions or proceedings arising in connection with this Agreement shall be tried and litigated only in the state courts located in San Bernardino County, California, and the federal courts located in Riverside County, California.

8.8 If one or more of the sentences, clauses, paragraphs or sections contained in this Agreement is declared invalid, void or unenforceable by a court of competent jurisdiction, the same shall be deemed severable from the remainder of this Agreement and shall not affect, impair or invalidate the remaining sentences, clauses, paragraphs or sections contained herein, unless to do so would deprive a Party of a material benefit of its bargain under this Agreement.

IN WITNESS WHEREOF, duly authorized representatives of City and Consultant have signed in confirmation of this Agreement.

CITY OF REDLANDS

By: _____
Mario Saucedo, Mayor

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.

By: _____
Benjamin Arata, Principal

ATTEST:

_____
Jeanne Donaldson, City Clerk

EXHIBIT "A"

SCOPE OF SERVICES

Task 1 – General Arrangement Development Plan

The proposed flare system will be located on an undeveloped portion of the facility property located north and west of the existing flare station and north of the existing wastewater treatment facility drying beds. Consultant proposes to prepare a general arrangement plan for the City selected ZULE flare package. Consultant has assumed a preliminary flare compound area of approximately 1,500 square feet (SF) of available space for the proposed flare stack, gas blowers, air blower, programmable logic controller (PLC), condensate sump and utility infrastructure.

Consultant's efforts in preparing the general arrangement development plan drawings consist of civil site engineering design, City provided survey information (topo, as-built site features and existing utilities), GCCS As-Built piping determinations, process piping alignment, interconnection of the WWTP DG and the existing GCCS LFG. Consultant will review City provided existing and any proposed utility infrastructure to develop an existing conditions site plan proximate to the proposed flare compound.

Consultant assumes the following:

- There is no need for land subdivision effort and the parcel has the proper zoning classification for this use;
- No CEQA (California Environmental Quality Act) or NSR (New Source Review), efforts will be completed as part of this project;
- No CUP (Conditional Use Permit) or local permitting is included in the scope of work provided;
- Off-site utility design is not required for this project. This includes, but is not limited to, electric, water, sewer, and gas service;
- The proposed facility will result in a total land disturbance of less than one (1) acre; and
- Consultant does not include services to complete a wetland and stream delineation and associated reports.

For data provided to Consultant in AutoCAD drawing file (.dwg) format, Consultant requests that files reference a basis of bearings and vertical benchmark. In the event PDF drawings are provided, the referenced information will be identified as approximate. Consultant assumes that one (1) in-person site visit will be required as part of this task.

Consultant will provide information to identify critical locations and elevations required for the general arrangement development plan. The City is responsible to contract with the site surveyor. Consultant may require the following information if not readily available from the City:

• Verify a minimum of three (3) existing ground control points based on the California State Planes, Zone 5, horizontal GRD coordinates, US Survey Feet NAD 83 (2011) per NGS data sheet EV9296 "BRYN RESET" and vertical datum will be referenced to a standardized datum (i.e., NGVD29). If information is provided in a local coordinate system relevant to the site and project location the associated conversion or shift must be provided.

• As an accurate as-built drawing of the existing flare equipment and GCCS system is not available, a 3D terrestrial scan of the existing landfill gas collection and control system components may be required at the City's expense. If required, the Consultant will notify the City within 60 days of notice to proceed.

• If the 3D terrestrial scan is required, Consultant will extract certain key data points of the landfill gas collection and control system components from the City provided data. This work would be limited to specific points and locations as directed by the design team and does not include the extraction, processing, or modeling of the entire data set.

• The deliverable for this work would include a City provided point file with the coordinates and elevations of the extracted points, an AutoCAD file with the extracted points, and Consultant will present an exhibit, in portable document format (.pdf), depicting the extracted points (if required).

• Although not anticipated seasonal conditions and foliage/ground cover conditions are not an undue impediment to the completion of the survey. The City appointed surveyor will coordinate with Consultant to execute the required survey effort to include all requested information.

• The City Surveyor should be made available to document utilities and obstructions identified during Subsurface Utility Engineering efforts included in Task 4 – Geotechnical Engineering and Geotechnical Drilling.

The project schedule will allow the field portion of this survey to be conducted at a time where the project site area would not unduly obscure the ground surface, site improvements, and/or utilities. If the area to be surveyed is adversely impacted by either of the conditions stated above, the City shall be notified and a decision will be made as to whether the survey work will be initiated at a potentially higher cost and delayed schedule, or the start of fieldwork delayed until site conditions are remediated.

Task 2 – Detailed Site Integration Design of Selected Flare

Consultant will prepare an existing conditions base map utilizing the recent topographic survey dated December 12, 2024, compiled by Aero Tech Surveys and provided by the City. Consultant

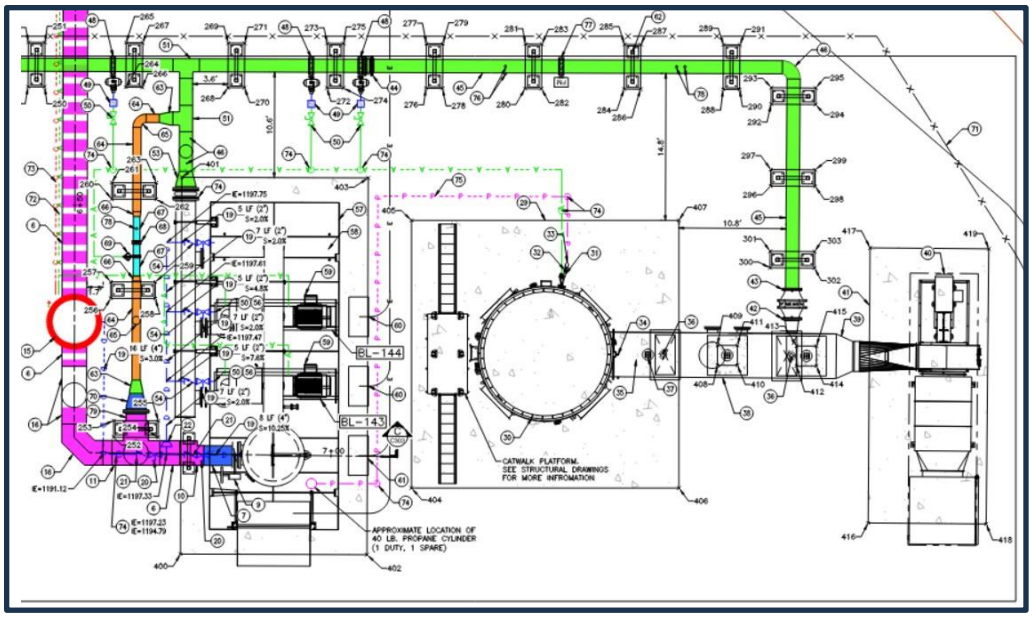
will utilize this to prepare a site layout/geometric and grading plan. This will reflect a minimum of two (2)- foot and ten (10)-foot contours.

Utilizing the topographic map, City provided as-built information (PDF's), City provided general arrangement (CAD as provided to the City by John Zink Hamworthy Combustion) and terrestrial scanning (if required) site survey (described under Task 1), Consultant will develop a conceptual general arrangement development plan for City review and comment.

Development of the general arrangement drawings will be an iterative process involving review and input from the City. The conceptual general arrangement development plan is anticipated to include improvements for site access, the landfill biogas treatment system facility and associated pipework, schematic representation of drainage features, and other miscellaneous site features necessary to define the proposed work. Other site constraints, including easements, rights-of-way, existing utilities, zoning/setback requirements (if any), etc. will be reviewed during concept phase. Given site constraints, and if space permits vehicle access, Consultant will analyze vehicles movements to confirm if truck access is attainable to each component of the flare compound and provide exhibits illustrating vehicle movements.

Consultant will develop the general arrangement development plan drawings utilizing the existing conditions base map. Consultant will show the existing stormwater measures such as swales, culverts, trench drains, pipes, and/or inlet requirements to convey the stormwater runoff to the existing storm sewer system or regional stormwater management facilities. Existing landfill gas collection system process piping, dual containment force mains, and drainage pipe alignments, locations, material, and sizes will be indicated for interconnection purposes.

General arrangement plans will be developed to convey the overall spatial arrangement of the flare compound, system process equipment and piping for the designated interconnection. The scope of services for this task will also consist of an engineering evaluation and design services to determine the optimum location, arrangement, and alignment of the proposed flare compound. The general arrangement development plan will present the orientation and locations of the proposed flare compound including but not limited to an enclosed flare (John Zink ZULE) 7'-0" Diameter x 40'-0" high stack, combustion air blower, two (2) gas blowers, knockout vessel, condensate sump, flame arrestor, landfill gas block valves, combustion flowmeters, biogas flowmeter, operational groupings, considering the space requirements for process piping interconnections.



Flare Integration Design Example

The detailed design will utilize equipment plot dimensions prepared in CAD by John Zink Hamworthy Combustion Biogas Systems and provided by the City to the Consultant. Consultant anticipates that the flare stack will measure approximately 7'-0" in diameter and 40'-0" in height, while the air piping and combustion blower plot dimension will measure approximately 65'-0" in length and 8'-0" in width. Anticipated blower skid plot dimensions are approximately 20'-0" in length and 8'-0" in width. Consultant will finalize the design based on mutually agreed upon changes. Consultant will prepare construction level drawings, of sufficient detail, for obtaining bids from City-approved contractors.

Preliminary design of foundations and structures will be included to evaluate area and spacing requirements. The general arrangement development plan will present the equipment orientation, locations, alignment and interconnections of the required interconnection process piping and condensate drain lines and force mains, and include the following:

- Development of 2D equipment general arrangement development plan utilizing original equipment manufacturer (OEM) drawings showing relative layout within the process area boundaries.

- Enlarged process area arrangement drawings, as needed for clarification, using the overall process area general arrangement drawing.

- If 3D models of OEM equipment are available from the manufacturer, Consultant can include these models into a basic plant model to assist in evaluating issues with safety, operability, maintenance, and constructability.

- Incorporation of the required structural, civil, key infrastructure and utilities that need to be considered for construction.

Deliverables: Final Design Drawings

- *COVER SHEET*
- *GENERAL NOTES AND LEGEND*
- *EXISTING GCCS LAYOUT (if available from the City)*
- *EXISTING CONDITIONS*
- *PROPOSED CONDITION LAYOUT*
- *HEADER PLAN AND PROFILE*
- *FLARE COMPOUND LAYOUT*
- *DETAILS*
- *EROSION AND SEDIMENT CONTROL PLAN*
- *EROSION AND SEDIMENT CONTROL PLAN DETAILS*

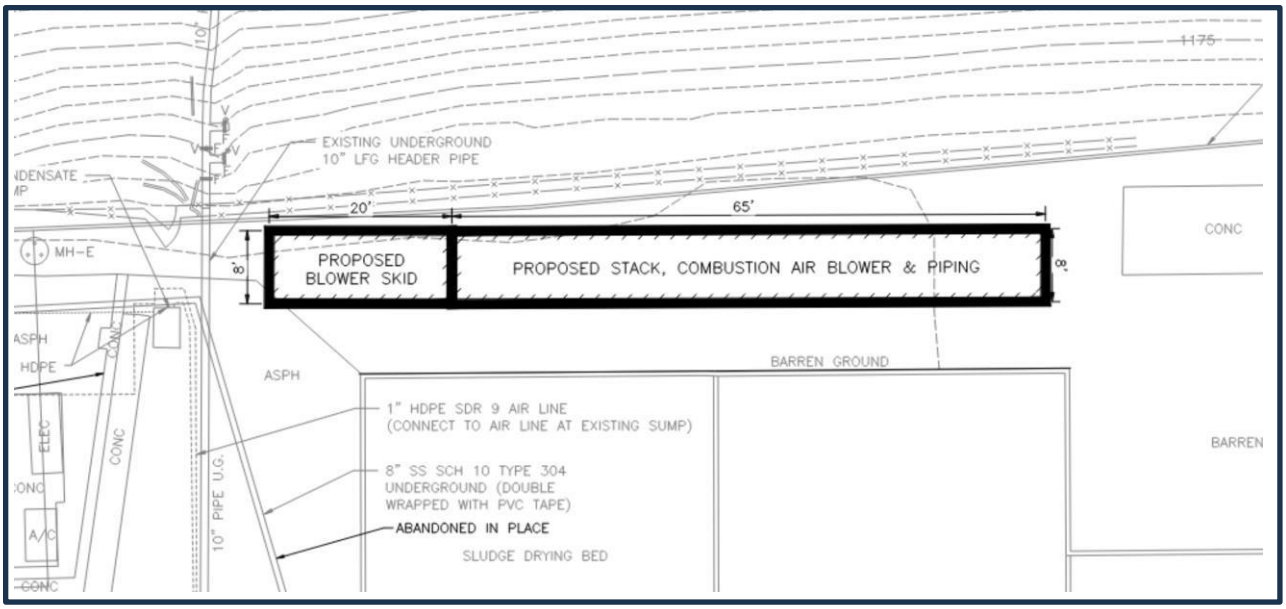
Task 3 – Structural Engineering

Consultant will subcontract with Response Structural Engineers (RSE). The subconsultant will provide structural calculations, foundation design, and anchorage schedule for the flare foundation, air blower foundation, gas blowers foundation, Variable Frequency Drive (VFD) cabinets and required pipe supports. Consultant will incorporate approved structural design drawings into Consultant's final for construction drawing set.

Project Description:
Provide structural calculations, foundation, and anchorage schedule for Flare Foundation, Air Blower Foundation, Gas Blower Foundation, Pipe Supports. Shallow or Mat Foundations assumed, includes response to Consultant Comments Fee is based on the preliminary information outlined below.

Structural Scope Items:
Foundations, anchorage and piping support for items listed below.

Structural Exclusions:
Geotechnical, Architectural, Civil and Mechanical Electrical and Plumbing (MEP) Designs.
Site Visits not included.



Preliminary Layout

Landfill Gas and Digester Gas Flare, Consisting of:

- Knockout Vessel, LS -100
- Digester Gas and Landfill Gas Blend Line.
- Knockout Vessel, LS-101, for Blended Digester Gas and Landfill Gas.
- Two (2) Landfill Gas Blowers.
- One (1) Combustion Air Blower, 9,000 SCFM Capacity.
- One (1) Flame Arrestor.
- Two (2) Automatic Landfill Gas Block Valves.
- One (1) Biogas Flow Meter, with Recorder.
- One (l) Combustion Air Flow Meter, with Recorder.
- One (l) Enclosed Flare, John Zink, Model No. ZULE (Zink Ultra Low Emissions) or Equivalent, 31.6 MMBtu/hr (HHV), 7'-0" Diameter x 40'-0" High, Propane Pilot, Ground Level, with a Combustion Air Blower, Temperature Indicator and Recorder, Automatic Combustion Air Fuel Ratio Control, and UV Flame Scanner.
- Two (2) Propane Vessels, V-102 and V-103, Used for Pilot Fuel.

Special Conditions:

- Site Visits not included in our structural fees.
- Fee assumes that RSE drawings can show anchor locations, specifications and details.
- Detail references will be coordinated with overall plans by Civil Engineer.
- RSE will work with the geotechnical engineer to come up with recommendations appropriate for this type of structure.
- Fee assumes that pertinent elevation data will be designed/provided by Civil Engineer. This information will be used to set footing and superstructure height.

Task 4 – Geotechnical Engineering and Geotechnical Drilling

As part of the flare design, Consultant will subcontract with Converse Consultants (Converse) to perform a geotechnical investigation report. The investigation activities will obtain relevant data to the site integration of the flare station and blower skid package. The general arrangement of the flare compound is anticipated to be 8'-0" Wide x 85'-0" Long in plan dimension. It is anticipated that the equipment will be founded on a concrete mat foundation with loads of less than approximately 1,000 pounds per square foot. The flare station will be located outside of refuse.

It is the Consultant's understanding that there is no existing geotechnical data available for the proposed location of the replacement flare. Groundwater at the site is estimated to exist at a depth of 100.0 feet. Soils are anticipated to consist of silty sand.

Project Set-Up

As part of the project set-up, staff personnel from Converse will conduct the following:

- Review as-built drawings and geotechnical report (if available).
- Review geology and groundwater maps to assess the existing subsurface conditions.
- Conduct a site reconnaissance and mark the boring locations.
- Submit Converse field exploration plan for your review and approval.
- Obtain any permits required by the City of Redlands (assume permit fees are waived).
- Notify underground Service Alert (USA) at least 48 hours prior to drilling to clear the
- boring locations of any conflict with existing underground utilities.
- Coordinate the field investigation schedule with the City of Redlands.
- Discuss specific requirements with the Structural Engineer.

Subsurface Exploration

Converses subsurface investigation will include drilling a total of one (1) exploratory boring to a maximum depth of 50.0 feet. If refusal is encountered on the first boring, an additional boring will be attempted. If required, a third boring can be performed with approval of a change order. The actual boring locations will be determined in coordination with the Consultant and the City, based on accessibility of the drill rig, landfill operations and underground utilities.

The purpose of the boring will be to:

- Obtain subsurface information at the proposed flare station.
- Obtain undisturbed and bulk samples of the various soil types for laboratory testing.

If refusal is encountered before the plan depth is reached, the boring will be terminated at that depth.
The boring will be drilled with a truck mounted rig, equipped with hollow stem auger, for soils sampling. Soils will be continuously logged and classified by the geologist/engineer in the field by visual examination in accordance with the Unified Soil Classification System.

Alternate Standard Penetration Test (SPT) and ring soil samples will be collected at two (2) foot intervals in the upper 10 feet and then at five (5) feet intervals thereafter. SPT samplers will be collected in accordance with ASTM D1586 and ring-lined Modified California split- barrel samplers in accordance with ASTM D3550. Bulk samples of near surface soils and every major change of soil stratigraphy will also be collected from auger cuttings and placed in sealed plastic bags.

Modified California drive samples will be collected with a 3.0-inch outside diameter, 2.5-inch inside diameter split-barrel sampler, and a 2.42-inch inside diameter cutting shoe. The sample barrel will be with 18-inches of metal rings for sample collection and has an additional length of waste barrel. Stainless steel or brass liner rings for sample collection are one (1)-inch high, 2.42-inch inside diameter, and 2.5-inch outside diameter. Modified California drive samples will be retained in metal rings and placed in sealed plastic canisters to prevent loss of moisture.

SPT drive samples will be obtained using a two (2)-inch outside diameter, and 1.375-inch inside diameter split-spoon sampler without lining. The soils recovered from the SPT sampling will be stored in sealed plastic bags to preserve the natural moisture content.

At each sampling interval, the drive samplers will be fitted onto a sampling rod, lowered to the bottom of the boring, and driven 18 inches or to refusal (50 blows per 6 inches) with a 140-pound free-falling hammer, from a height of 30 inches, using an energy-calibrated hammer delivery system. Compared to SPT, the Modified California drive sampler provides less disturbed samples.

The borings will be backfilled with soil compacted by pushing down with augers, using the weight of the drill rig. Excess soil will be spread at the site.

Laboratory Testing

Soil samples obtained during exploratory drilling will be tested in Converse's laboratory to evaluate their physical characteristics and engineering properties. Laboratory testing may include, but will not necessarily be limited to, the following:

- In-place moisture content;
- Soils corrosivity;
- Sieve analysis;
- Atterberg limits;
- Laboratory maximum density;
- Direct shear; and
- Consolidation.

Engineering Analyses and Geotechnical Report

A draft and a final geotechnical investigation report will be prepared for the project. The content of the report is listed below.

- Project description.
- Description of the streets along the pipe alignments.
- A description of the field procedures used in the investigation.
- A description of subsurface conditions and controlling engineering properties of the subsurface materials encountered, including documentation of the borings and sampling locations, and groundwater level.
- Evaluation of groundwater effects (if encountered) and the necessity for dewatering during construction. Dewatering recommendation is NOT part of this scope of work.
- Discussion on the laboratory test results, including soil corrosivity.
- Location of faults and potential impacts.
- Seismic design parameters based on 2022 California Building Code (CBC).
- Compaction characteristics of soil types relative to their use as fill and backfill.
- Geotechnical parameters for pad design, including bearing capacity.
- Suitability of excavated materials for use as fill.
- Excavatability of soils.
- Lateral earth pressures.
- Since Converse does not practice in the area of corrosion engineering, our report will include typical soil corrosivity test results and general comments on the overall corrosivity of the soils. It will not include specific mitigation recommendation.

Geotechnical Engineering and Drilling Services Assumptions

- The field work will be done in one mobilization during normal weekday working hours.
- BORING LOCATION WILL BE DETERMINED BY CONVERSE IN CONSULTATION WITH THE CONSULTANT AND THE CITY OF REDLANDS. THE CITY OF REDLANDS MUST VERIFY THAT TO THE BEST OF THEIR KNOWLEDGE NO UNDERGROUND STRUCTURES EXIST AT THE LOCATION OF THE PROPOSED BORING. CONVERSE WILL ALSO UTILIZE THE SERVICES OF A THIRD PARTY UNDERGROUND LOCATION SERVICE.
- Access to the job site will be available during normal weekday working hours at no additional cost to Consultant.
- Permit from the City of Redlands, if required.
- No traffic control required.
- No refuse will be encountered in our test boring.
- Level D protection will be required during our field investigation.
- Boreholes will be backfilled with soils.
- One electronic pdf copy of the draft report will be submitted for review. Four hard copies of the report will be submitted, signed, and stamped by a registered Civil/Geotechnical Engineer (Converse)
- It is understood by both contracting parties that the design phase of the project **ONLY drill rig subject to prevailing wage** as defined in Labor Code Sections 1770-1780.

Task 5 – Electrical Engineering

Electrical design engineering work for the construction of a new flare will be performed by Consultant.

Consultant will review existing plans in detail and verify points of connection for the new flare in the field. After verification of field points, the subconsultant will prepare construction drawings. Consultant will incorporate the final electrical design work into construction level drawings.

Deliverables:

- *Electrical Load List*
- *Single Line Diagrams*
  o Low Voltage
- *Grounding Plans*
- *Conduit Plans*
- *Electrical Distribution Plans*
- *Panel Schedules*
- *Conduit and Cable Schedule (power, control, & network) with termination Information*
- *Equipment Datasheets and Quote Review*
  o Low-voltage Switchboard

Task 6 – Permitting Assistance

The Consultant acknowledges that a revision to the existing Permit to Construct, issued by the SCAQMD on September 3, 2024, will be required. The revision pertains specifically to updates in the Equipment Description under Application No.616379.

The Consultant will support the City in preparing and submitting the amended permit application. This includes coordination with SCAQMD staff, preparation of the revised Permit Application Form, and incorporation of previously prepared supporting documentation. The City will provide the Consultant with the original SCAQMD application materials in advance of any scheduled meeting with the regulators.

The Consultant will submit the amended application package and respond to up to two (2) rounds of comments. Resubmissions will be made as necessary to obtain the revised Permit to Construct. It is assumed that the permitting fees will be paid directly by the City and are not included in the Consultant's scope of services.

The Consultant has allocated a total of eight (8) hours for Principal-level support, 16 hours for Project Management, and 16 hours for Project Consultant services on a time-and-materials basis. Should additional effort be required beyond these allocations, a Change Order will be submitted to the City for approval.

Task 7 – Bid Package

The Consultant will prepare a bid package for issuance to third-party contractors to perform the required construction work. This package will include the design documents developed under the preceding tasks, integrated with the City's standard contract documents and a formal bid form. Consultant will require the City to provide its standard contract documents in advance to include in the bid package.

The Consultant will participate in the pre-bid meeting, anticipated to be held via Microsoft Teams, and will respond to contractor inquiries received during the bidding period. Consultant will also support the City in evaluating contractor proposals and provide award recommendations.

Deliverables:

- *Instruction to Bidders;*
- *Drawings/Plans from the work; and*
- *Specifications for the Work (Specifications Notes may be included within Drawings).*

If available Consultant will incorporate the following City provided contracting documents:

- *Construction Agreement;*
- *Standard General Conditions for Construction;*
- *Scope/Schedule/Price;*
- *Contractor's Health & Safety;*
- *Insurance Requirements;*
- *Application for Payment;*
- *Change Order;*
- *Lien Release;*
- *Final Payment;*
- *Other Contract Administrative Forms;*
- *Distribution of the bid package up to five (5) qualified contractors;*
- *Attendance at the pre-bid meeting via Microsoft Teams;*
- *Preparation and submittal of meeting minutes from the pre-bid meeting;*
- *Written responses to contractor questions submitted during the bidding process; and*
- *Evaluation of contractor proposal and recommendation of award.*

Assumptions

Consultant has assumed that the following information and documents will be made available prior to work being initiated:

- Flare design and Hazardous Area Classification design will be performed by others. The City will provide Consultant with most up-to-date enclosed flare design specifications.
- Surveying is not included in Consultant's scope of service and is the responsibility of the City of Redlands.
- All as-built drawings showing existing infrastructure, including utilities, which will impact the site layout, will be provided to the Consultant.
- Drawings will be prepared using the Consultant CAD Standards .dwg file.

- The latest site topographic and planimetric information will be provided to the Consultant as an AutoCAD Civil 3D .dwg file.
- California Environmental Quality Act (CEQA) is excluded from this scope of services.
- Construction Management (CM) is excluded from this scope of services.
- Construction Quality Assurance (CQA) is excluded from this scope of services.
- The City is to pay all permit fees, unless the Consultant is otherwise directed and reimbursed in accordance with a direct cost markup of 12%.
- Revisions to the site Title V permit or emissions limits at the site will not be required and are excluded from this scope of services.
- Emissions offsets, if required, will be purchased by the site.
- The Consultant assumes there will be no modifications to Existing Site Area Classifications.
- The Consultant will only request three quotes for equipment.
- The client will provide specifications for the network equipment as well as any corresponding network cabling.
- Wiring diagrams with termination information will be provided for the process equipment by the respective vendors.
- The Consultant will include control wiring terminations in the cable schedules for the equipment where termination details are provided by the vendor.

EXHIBIT "B"
PROJECT FEE SCHEDULE & HOURLY RATES

Task	Description	Estimated Total
01	Site Assessment and Existing Utility Review (Lump Sum)	$13,000
02	Detailed Flare Design (Lump Sum)	$88,500
03	Structural Engineering (Lump Sum)	$40,500
04	Geotechnical Engineering – (Lump Sum)	$30,000
05	Electrical Engineering (Lump Sum)	$71,000
06	Permitting Assistance (T&M)	$8,200
07	Bid Package (Lump Sum)	$17,000
	Total Estimate	**$268,200**

Work will be invoiced monthly on a percent complete basis. If project conditions are different than those assumed herein, or additional services appear necessary during the execution of the project, Consultant will contact the City to discuss these conditions and obtain approvals before proceeding with additional services. Additional services will be invoiced on a time and materials basis using the Billable Hourly Rates Schedule of Fees provided below and will be valid through December 31, 2025.

Billable Hourly Rates:

2025 California Rate Sheet	
	New Rate
Vice-President	$ 345.00
Senior Principal	$ 303.00
Principal	$ 281.00
Senior Consultant	$ 263.00
Senior Project Manager	$ 236.00
Project Manager III - Engineer	$ 206.00
Project Manager III	$ 206.00
Project Manager II	$ 194.00
Project Manager	$ 182.00
Project Manager I	$ 182.00
Assistant Project Manager	$ 175.00
Assistant Project Manager	$ 175.00
Project Scientist	$ 146.00
Project Consultant	$ 146.00
Staff Consultant	$ 135.00
Staff Scientist	$ 135.00
Designer	$ 126.00

2025 California Rate Sheet (ctd.)	
Senior Designer	$ 126.00
Senior Technician	$ 121.00
Survey Technician II	$ 118.00
Cadd Technician	$ 110.00
Cad Operator	$ 110.00
Field Technician	$ 101.00
GIS Analyst II	$ 101.00
Survey Technician I	$ 101.00
Office Manager	$ 91.00
Seasonal Intern	$ 89.00
Administrative	$ 89.00
Secretary	$ 89.00

EXHIBIT " C "

WORKERS' COMPENSATION INSURANCE CERTIFICATION

Every employer, except the State, shall secure the payment of compensation in one or more of the following ways:

(a) By being insured against liability to pay compensation by one or more insurers duly authorized to write compensation insurance in this State.

(b) By securing from the Director of Industrial Relations, a certificate of consent to self-insure, either as an individual employer, or as one employer in a group of employers, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his or her employees.

CHECK ONE

_____I am aware of the provisions of Section 3700 of the Labor Code which requires every employer to be insured against liability for Workers' Compensation or to undertake self-insurance in accordance with the provisions of that Code, and I will comply with such provisions before commencing the performance of the work and activities required or permitted under this Agreement. (Labor Code §1861).

_____I affirm that at all times, in performing the work and activities required or permitted under this Agreement, I shall not employ any person in any manner such that I become subject to the workers' compensation laws of California. However, at any time, if I employ any person such that I become subject to the workers' compensation laws of California, immediately I shall provide the City with a certificate of consent to self-insure, or a certification of workers' compensation insurance.

I certify under penalty of perjury under the laws of the State of California that the information and representations made in this certificate are true and correct.

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.

By:_____ Date: _____
BENJAMIN ARATA, PRINCIPAL

Sole Source/ Single Source/ Standardization Form

For procurement of supplies, equipment and services valued at $5,000 and over

NOTE: Every question must be answered with appropriate documentation attached; incomplete forms will be immediately rejected by Purchasing.

Date: 7/29/25

TO: Purchasing Division

FROM: FCS- Solid Waste Division

Purchase Requisition # _____

Estimated Total Cost: $ 268,200

Proposed Vendor: Civil & Environmental Consultants, Inc.

Request Term: FY 2025-26

This form must accompany the purchase document whenever an exception to the competitive process is requested. Requests for goods and/or services from a specific vendor or limited to a specific brand, where substitutes to the recommended vendor or brand are unacceptable, must be accompanied by a written justification explaining the circumstances that make alternatives unacceptable.

The City Manager will determine whether the justification is appropriate. Requests for exception must be supported by factual statements that will pass an audit.

INSTRUCTIONS

1. Please check all applicable categories (a. through i.) below and provide additional information where indicated.

☐ a. The requested product is an integral repair part or accessory compatible with existing equipment.

Existing Equipment: _____

Manufacturer/Model Number: _____

Age: _____

Current Estimated Value: _____

☐ b. The requested product has unique design/performance specifications or quality requirements that are not available in comparable products.

☐ c. I have standardized the requested product and the use of another brand/model would require considerable time and funding to evaluate.

☐ d. The requested product is one in which I (and/or my staff) have specialized training and/or extensive expertise. Retraining would incur substantial cost in time and/or funding.

☐ e. The requested product is used or demonstration equipment available at a lower-than-new cost.

☐ f. Repair/Maintenance service is available only from manufacturer or designated service representative.

☐ g. Upgrade to or enhancement of existing software is available only from manufacturer.

■ h. Service proposed by vendor is unique; therefore, competitive bids are not available or applicable.

■ i. Other factors (provide detailed explanation in #2 below).

2. Provide a detailed explanation and pertinent documentation *for each category* checked in item 1 above. Attach additional sheets if necessary:

Civil & Environmental Consultants (CEC) has been integrally involved in the design and permitting of the flare system at the California Street Landfill and Wastewater Treatment Plant, including technical review of the SCAQMD permit, gas flow analysis, and system sizing. Their expertise and familiarity with the site-specific conditions, regulatory requirements, and the selected John Zink flare system make them uniquely qualified to complete the remaining scope of work. Continuing the task of integrating the new flare with CEC ensures continuity, protects the

3. Was an evaluation of other equipment, products, or services performed?

☐ Yes ■ No

***If yes, please explain the type of evaluation performed and provide all supporting documentation*:**

N/A

4. List below the name of each individual who was involved in the evaluation, if conducted, and in making the recommendation to procure this product or service. Attach additional information, if necessary.

Tabitha Crocker, Louie Miranda

5. Explain what action(s) the department would take if the sole/single source services were no longer available

If CEC's services were no longer available, the City would be required to issue a Request for Proposal and retain a new consultant. Transitioning to a new firm at this stage would likely cause significant delays, increased costs, and disruptions to regulatory compliance. Specifically, it would delay the integration of the flare system, impact the overall project schedule, and jeopardize regulatory alignment, as CEC's work is directly tied to the approved SCAQMD permit. A change in consultant could potentially trigger a permit re-review process and increase the risk of noncompliance with air quality regulations. Furthermore, the selected ZULE flare system was chosen based on CEC's technical input and coordination, making their continued involvement critical to ensure proper system integration.

6. I certify that the above information is accurate to the best of my knowledge, and a signed copy of this document will be kept on file and available for audit in my department

Nathalie Ayala Digitally signed by Nathalie Ayala
Date: 2025.07.29 13:27:07 -07'00'

Prepared by Date

Tabitha Crocker Digitally signed by Tabitha Crocker
Date: 2025.08.07 14:26:32 -07'00'

Department Director Date

Purchasing Approvals

Purchasing Agent Approval Date

City Manager Approval Date

Explanation Continued

2. Civil & Environmental Consultants (CEC) has been integrally involved in the design and permitting of the flare system at the California Street Landfill and Wastewater Treatment Plant, including technical review of the SCAQMD permit, gas flow analysis, and system sizing. Their expertise and familiarity with the site-specific conditions, regulatory requirements, and the selected John Zink flare system make them uniquely qualified to complete the remaining scope of work. Continuing the task of integrating the new flare with CEC ensures continuity, protects the integrity of the design, and is in the best interest of the City.

5. If CEC's services were no longer available, the City would be required to issue a Request for Proposal and retain a new consultant. Transitioning to a new firm at this stage would likely cause significant delays, increased costs, and disruptions to regulatory compliance. Specifically, it would delay the integration of the flare system, impact the overall project schedule, and jeopardize regulatory alignment, as CEC's work is directly tied to the approved SCAQMD permit. A change in consultant could potentially trigger a permit re-review process and increase the risk of noncompliance with air quality regulations. Furthermore, the selected ZULE flare system was chosen based on CEC's technical input and coordination, making their continued involvement critical to ensure proper system integration.

CEC Sole Source Justification

The City of Redlands engaged CEC to provide technical review and design support for the integration of the flare system at the California Street Landfill and Wastewater Treatment Plant. CEC was initially retained by American Internation Environmental, Inc. (AIE) to conduct a third-party review of the SCAQMD Permit Application (No. 616379), including evaluation of the proposed flare design and its capacity to manage combined landfill and digester gas flows.

CEC's involvement has since expanded to include detailed analysis of gas production projections, flare sizing, and operational parameters necessary to meet SCAQMD requirements. The SCAQMD permit directly affect the City selection of the Flare provider to correspond with the outlined flare design criteria. The City selected John Zink Hamworthy Combustion to minimize revisions to the SCAQMD permit. CEC's familiarity with the site-specific conditions, regulatory framework, and technical specifications make them uniquely qualified to continue with the following tasks outlined:

- Task 1 - General Arrangement Development Plan
- Task 2 – Detailed Site Integration Design of Selected Flare
- Task 3 – Structural Engineering
- Task 4 – Geotechnical Engineering and Geotechnical Drilling
- Task 5 – Electrical Engineering
- Task 6 – Permitting Assistance
- Task 7 – Bid Package

The objective of the proposed project to integrate the City selected Zink Ultra Low Emissions Enclose Flare (ZULE) and replace the existing flare as the primary control device while maintaining operational compliance at the California Street Landfill and Wastewater Treatment Plant. CEC's integral role in the development of the flare system, site design and permitting strategy, transitioning to a new consultant could result in significant delays, duplication of effort, and increased costs. To ensure continuity, maintain regulatory compliance, and preserve the integrity of the site integration design, sole sourcing CEC for the remaining scope is both justified and in the City's best interest.

Please let me know if you have any questions.

Benjamin Arata | *Principal*
Civil & Environmental Consultants, Inc.
2356 Gold Meadow Way, Suite 120, Gold River, CA 95670
mobile 610-952-0634
www.cecinc.com

City Council Meeting **J. 6.**

DATE: 10/21/2025

TO: Honorable Mayor and City Council Members

SUBJECT: Consideration of a $725,210.49 purchase order modification with Enterprise FM Trust for the vehicle lease and maintenance program resulting in a total purchase order amount not to exceed $3,791,433.53 and a total contract amount not-to-exceed $8,519,823.38 (Facilities and Community Services Director Crocker)

MOTION(S):

If the City Council determines that staff's recommendation is appropriate, the following motion is provided:

I move to approve a $725,210.49 purchase order modification with Enterprise FM Trust for the vehicle lease and maintenance program, resulting in a total purchase order amount not to exceed $3,791,433.53 and a total contract amount not-to-exceed $8,519,823.38.

RECOMMENDATION:

Staff recommends that the City Council approve a $725,210.49 purchase order modification with Enterprise FM Trust for the vehicle lease and maintenance program, resulting in a total purchase order amount not to exceed $3,791,433.53 and a total contract amount not-to-exceed $8,519,823.38.

DISCUSSION:

The City of Redlands Equipment Maintenance Division oversees the maintenance of over 650 vehicles and equipment and the maintenance and operations of the City's fuel station at the corporate yard. In July 2019, the City entered into a Master Equity Lease Agreement with Enterprise Fleet Management, Inc. for a light-duty and medium-duty vehicle lease and maintenance program.

This agreement has resulted in a structured and methodical vehicle replacement program. The goals of the program are to lower the average age of the fleet; achieve a reduction in net operating costs, as newer vehicles significantly lower maintenance expenses and have increased fuel efficiency; and improve the safety of staff operating city vehicles.

Staff recommends modifying the existing Purchase Order with Enterprise Fleet Management for the City's vehicle lease program to carry forward unspent funds from Fiscal Year 2024-25 into Fiscal Year 2025-26. The unspent funds are attributable to vehicles ordered during Fiscal Year 2024-25 that have not yet been delivered and, therefore, were not invoiced within the prior fiscal year.

This action does not increase the overall spending authority previously approved by City Council but ensures that the remaining balance is available to support the ongoing vehicle lease program. Carrying forward these funds will allow the City to meet lease payment schedules, maintain continuity of fleet operations, and avoid delays in vehicle replacement cycles. This modification aligns with the City's procurement and financial management practices by efficiently utilizing existing appropriations rather than requiring new allocations of funds.

ALTERNATIVES:

Council may elect not to approve the purchase order modification. However, this will greatly impact the operations of the affected departments.

STRATEGIC PLAN:

Not Applicable.

SUBMITTED BY:
Tabitha Crocker, Facilities and Community Services Director

RECOMMENDED BY:
Charles M. Duggan Jr., City Manager

REVIEWED BY:
Christopher Boatman, Assistant City Manager
Janice McConnell, Assistant City Manager
Danielle Garcia, Management Services/Finance Director
Dana Abramovitz-Daniel, Procurement Manager

PREPARED BY:
Tricia Swope, Manager, Facilities and Community Services

Fiscal Impact

Fiscal Year:	FY 2025-26
Appropriation Required Y/N:	N
Amount:	$725,210.49
Budgeted Y/N:	Y
Account No.:	various

Discussion:

The original Fiscal Year 2025-26 Purchase Order with Enterprise Fleet Management for the vehicle lease program was approved by City Council on July 1, 2025, in the amount of $3,066,223.04. Staff recommends increasing the Purchase Order by $725,210.49 to carry forward unspent funds from Fiscal Year 2024-25, resulting in a new not-to-exceed total of $3,791,433.53. This modification represents a continuation of previously approved appropriations and does not require additional General Fund allocations.

Attachments

Purchase Order

PURCHASE ORDER

Fiscal Year 2026

THIS PURCHASE ORDER NUMBER MUST APPEAR ON ALL INVOICES, PACKAGES, AND SHIPPING PAPERS.

Purchase Order Number **22650230**

Purchase Order Date **07/30/2025**

Department **FACILITIES & COMMUNITY SERVICE**

Required By **07/01/2025**

Bill To FINBIL

CITY OF REDLANDS
PO BOX 3005
REDLANDS, CA 92373
EMAIL: accountspayable@cityofredlands.org
Emailing invoice and referencing PO No. is required and will expedite payment

Ship To FLEET

FCSD-Fleet Div
1270 W Park Ave
Building E
Redlands, CA 92373

Vendor [redacted]

ENTERPRISE FM TRUST
ENTERPRISE FLEET MANAGEMENT CUSTOMER BILLING
PO BOX 800089
KANSAS CITY, MO 64180

VENDOR PHONE NUMBER	VENDOR FAX NUMBER	VENDOR NUMBER	REQUISITION NUMBER	BUYER NAME	DELIVERY REFERENCE
714-463-7631		[redacted]	12600343	Tricia Swope	

NOTES

FLEET - ENTERPRISE VEHICLE LEASE PROGRAM

ORDER TERM:
JULY 1, 2025 - JUNE 30, 2026.

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NOT TO EXCEED DOLLAR AMOUNT IS PER YEAR. THIS PO WILL BE CLOSED WHEN THE TOTAL AMOUNT IS EXHAUSTED.

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PURCHASE ORDER WILL BE VALID ONLY WITH A CURRENT APPROVED MINIMUM LIABILITY COVERAGE ON FILE WITH RISK MANAGEMENT.

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PURCHASE ORDER AS PER CITY COUNCIL APPROVAL DATED JULY 1, 2025, PER MASTER EQUITY LEASE AGREEMENT, MAINTENANCE AGREEMENT, AND MAINTENANCE MANAGEMENT & FLEET RENTAL AGREEMENT DATED JULY 2, 2019, AND PER SOURCELWELL CONTRACT NO. 030122-EFM DATED MAY 4, 2022.

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ITEM #	DESCRIPTION	QUANTITY	UOM	UNIT PRICE	EXTENDED PRICE
1	CMO HOMELESS SOLUTIONS MAINTENANCE	1.0000	EA	$1,050.3600	$1,050.36
2	CMO HOMELESS SOLUTIONLS LEASE	1.0000	EA	$20,513.8400	$20,513.84
3	DSD BUILDING & SAFETY MAINTENANCE	1.0000	EA	$1,049.5200	$1,049.52
4	DSD BUILDING & SAFETY LEASE	1.0000	EA	$16,076.1200	$16,076.12
5	DSD PLANNING MAINTENANCE	1.0000	EA	$380.0400	$380.04
6	DSD PLANNING LEASE	1.0000	EA	$5,443.3600	$5,443.36
7	LIBRARY MAINTENANCE	1.0000	EA	$615.7200	$615.72
8	LIBRARY LEASE	1.0000	EA	$11,332.1800	$11,332.18
9	PD MAINTENANCE	1.0000	EA	$4,345.6800	$4,345.68
10	PD LEASE	1.0000	EA	$93,292.2800	$93,292.28
11	PD LEASE MEASURE T	1.0000	EA	$917,652.0000	$917,652.00
12	FIRE MAINTENANCE	1.0000	EA	$2,558.1600	$2,558.16
13	FIRE LEASE	1.0000	EA	$245,048.2500	$245,048.25
14	FCS ADMIN MAINTENANCE MEASURE T	1.0000	EA	$1,300.2000	$1,300.20
15	FCS ADMIN LEASE MEASURE T	1.0000	EA	$23,978.5200	$23,978.52

Deana Abramovich-Daniel
PROCUREMENT MANAGER

Total Ext. Price $3,066,223.04

Purchase Order Total $3,066,223.04

PLEASE SEE ATTACHED PURCHASE ORDER TERMS AND CONDITIONS

CITY OF REDLANDS
PURCHASE ORDER TERMS AND CONDITIONS
unless otherwise specified in an executed agreement, the following shall apply

1. INVOICES: Each purchase order is to be invoiced separately and all invoices shall be submitted to the billing address as shown on the front of the Purchase Order. All invoices, shipping documents, correspondence, and-related papers must have the purchase order number and consignee shown clearly in their face.

2. PACKAGING AND DRAYAGE: Unless so specified on the Purchase Order and evidenced by a copy of the freight bill attached to the invoice, there shall be no charge to the City for either packaging and/or drayage

3. INSPECTION: All materials and workmanship provided under the terms of the Purchase Order are subject to inspection and test by the City to ensure compliance with the requirements and specifications contained therein. In the event that the goods or services delivered are defective, or are not in conformity with the Purchase Order, the City shall have the right to either reject said goods or services, or require that they be corrected or otherwise brought into conformity with the terms set forth in the Purchase Order.

4. RESPONSIBILITIES: Unless otherwise specified in the Purchase Order, the supplier/contractor shall be responsible for all items covered in said Purchase Order until delivered at the designated delivery point and thereafter accepted by the City. Supplier/contractor shall bear all risks as the goods and services provided until they are finally accepted by the City. Upon the City's notice to supplier/contractor of its rejection of the goods or services provided or the need for the correction thereof. All such defective goods or services shall be removed from City premises, and any and all expenses incurred in the removal and/or correction of such defective goods or services shall be borne entirely by the supplier/contractor.

5. ACCEPTANCE: The City's final acceptance of the goods or services provided under the Purchase Order shall be conclusive except in those instances where a latent defect or fraud is subsequently discovered, or when a supplier/contractor has committed such gross mistakes that they are tantamount to a fraud. The City's failure to inspect and either accept or reject the goods or services delivered shall not relieve the supplier/contractor for the responsibility for strict compliance with the terms and specifications of the Purchase Order.

6. CHANGES: This Purchase Order may, at any time, be changed with regard to the materials or services to be furnished, the quantity ordered, the unit price, discount, delivery point or arrangements, terms or any other matters affecting a valid order. However, in order to be effective, any such change or amendment causes an increase or decrease in the cost of performance hereunder, an equitable adjustment shall be made to reflect the increase or the decrease in the cost thereof. Any such adjustment shall be subject to the written approval of the Purchasing Agent. No variation in the quality, quantity, or coat of any item called for by this Purchase Order Shall be acceptable by the City except in pursuance of a written Change Order approved by the Purchasing Agent.

7. TERMINATION: This Purchase Order may be terminated, in whole or in part, at any time, by written notice to the supplier/contractor. Such termination shall be effective with respect to the quantity, manner, and time specified in such notice. The City shall be liable at the stipulated price only for such materials and/or services as have been delivered and/or rendered and accepted as of the effective date of said written notice. The City shall not be liable for any excess cost arising out of such termination, and failure of the supplier/contractor to cease delivery and/or work upon receipt of such termination notice shall not occasion a claim for extra costs.

8. TIME IS OF THE ESSENCE: In the event that the supplier/contractor fails to perform this Purchase Order within the time specified, the Purchasing Agent may, by written notice, order the supplier/contractor to cease further deliveries and may hold the supplier/contractor liable for any damages caused to the City by reason of such delay. If no time is specified, it is expected that the supplier/contractor shall begin performance within a reasonable time after placement of the order. The City may extend periods of performance if the facts as to the cause of the delay, in sole opinion of the Purchasing Agent, justify such an extension.

9. LIABILTIY: The supplier/contractor shall defend, indemnify and hold harmless the City, its elected officials, officers, employees, and agents from all claims, losses, damages, costs, expenses and suits, in law or in equity, because of personal injury, property damage, or alleged or actual patent infringements, based on the performance of this Purchase Order or asserted against it. Further, supplier/contractor warrants that the City shall not be responsible for any damages that may be claimed by reason or death injury of the person of the supplier/contractor's officer, agents, employees, invitees or licensees or for damage to any property of the supplier/contractor or any other damage that may arise or result at anytime because of personal injury or damage to property sustained by any other person or persons, which may have been caused or contributed by proximately or otherwise by reason of, or in course of, carrying out this Purchase Order.

10. DISPUTES: All disputes concerning questions of fact which may arise under this Purchase Order under this Purchase Order, and not disposed of by mutual agreement and/or consent, shall be decided by the sole discretion of the Purchasing Agent. All disputes concerning questions of law, which may arise under this Purchase Order, shall be decided under applicable laws of the State of California.

11. PAYMENTS: Payments shall be made upon submission of an itemized invoice, presented in duplicate of the prices stipulated in the Purchase Order and within 30 days of becoming due for supplies delivered and accepted or services rendered and accepted, less deductions if any. When requested by the supplier/contractor, payment on partial deliveries may be made whenever, in the sole discretion of the Purchasing Agent, the surrounding circumstances warrant such partial payment. In the event and, if for any reason, an overpayment is made; the City requires prompt refund of said overpayment by way of supplier/contactor's properly referenced check.

12. LICENSOR: All supplier/contractors who perform work within the City, must have on file at the Redlands City Revenue Office, a current and valid city business license.

13. CONFORMITY WITH SAFETY ORDERS: The goods and/or services covered by this Purchase Order or contract must conform to the safety order of OSHA, CAL-OSHA, and/or NIOSHA and any and all applicable material safety data sheets (MSDS).

14. PREVAILING WAGES: When applicable, the City is subject to the State of California prevailing wage laws as set forth in California Labor Code Section 1770 et seq. The contractor is responsible for determining the appropriate Department of Industrial Relations (DIR) classification for the various employees and subcontractors used for a particular project or service. The rates for each classification are posted on the DIR website at http://www.dir.ca.gov/DIRdatabases.html. All contractors performing work for the City are responsible for abiding by all applicable prevailing wage laws, and must furnish the City with Certified Payroll Records upon request.

Purchase Order # 22650230

ITEM #	DESCRIPTION	QUANTITY	UOM	UNIT PRICE	EXTENDED PRICE
16	FCS BUILDING MAINT.- MAINTENANCE	1.0000	EA	$4,327.4400	$4,327.44
17	FCS BUILDING MAINT. - LEASE	1.0000	EA	$61,286.4600	$61,286.46
18	FCS BUILDING MAINT. - LEASE MEASURE T	1.0000	EA	$53,462.0000	$53,462.00
19	FCS PARKS MAINTENANCE MEASURE T	1.0000	EA	$10,665.4800	$10,665.48
20	FCS PARKS LEASE MEASURE T	1.0000	EA	$177,034.5200	$177,034.52
21	FCS STREETS MAINTENANCE	1.0000	EA	$1,064.5200	$1,064.52
22	FCS STREETS MAINTENANCE MEASURE T	1.0000	EA	$4,583.4000	$4,583.40
23	FCS STREETS LEASE	1.0000	EA	$12,441.1200	$12,441.12
24	FCS STREETS LEASE MEASURE T	1.0000	EA	$67,540.6000	$67,540.60
25	FCS REC. & SR. SRVCS MAINTENANCE MEASURE T	1.0000	EA	$1,414.2000	$1,414.20
26	FCS REC. & SR. SRVCS LEASE MEASURE T	1.0000	EA	$20,114.8000	$20,114.80
27	FCS ANIMAL SERVICES MAINTENANCE	1.0000	EA	$1,285.9200	$1,285.92
28	FCS ANIMAL SERVICES MAINTENANCE MEASURE T	1.0000	EA	$1,064.5200	$1,064.52
29	FCS ANIMAL SERVICES LEASE	1.0000	EA	$135,192.1600	$135,192.16
30	FCS ANIMAL SERVICES LEASE MEASURE T	1.0000	EA	$25,543.4800	$25,543.48
31	MUED ADMIN MAINTENANCE	1.0000	EA	$6,008.2800	$6,008.28
32	MUED ADMIN LEASE	1.0000	EA	$93,704.4400	$93,704.44
33	MUED WATER DIST/PROD MAINTENANCE	1.0000	EA	$19,422.3600	$19,422.36
34	MUED WATER DIST/PROD LEASE	1.0000	EA	$480,568.2000	$480,568.20
35	FCS SOLID WASTE MAINTENANCE	1.0000	EA	$5,599.2000	$5,599.20
36	FCS SOLID WASTE LEASE	1.0000	EA	$125,682.2900	$125,682.29
37	MUED WASTEWATER MAINTENANCE	1.0000	EA	$7,034.8800	$7,034.88
38	MUED WASTEWATER LEASE	1.0000	EA	$220,741.1200	$220,741.12
39	FCS GROVES MAINTENANCE	1.0000	EA	$911.0400	$911.04
40	FCS GROVES LEASE	1.0000	EA	$17,360.2400	$17,360.24
41	FCS CEMETERY MAINTENANCE	1.0000	EA	$3,176.0400	$3,176.04
42	FCS CEMETERY LEASE	1.0000	EA	$68,158.9600	$68,158.96
43	MS IT MAINTENANCE	1.0000	EA	$599.6400	$599.64
44	MS IT LEASE	1.0000	EA	$7,849.5600	$7,849.56
45	FCS EQUIP. MAINT. - MAINTENANCE	1.0000	EA	$15,161.5000	$15,161.50
46	FCS EQUIP. MAINT. - LEASE	1.0000	EA	$47,788.4400	$47,788.44
47	PARTS / MATERIALS	1.0000	EA	$10,000.0000	$10,000.00
48	DMV / TOLL FEES	1.0000	EA	$13,800.0000	$13,800.00
49	TIRE / STATE FEES	1.0000	EA	$1,000.0000	$1,000.00

Total Ext. Price $3,066,223.04

Purchase Order Total $3,066,223.04

PLEASE SEE ATTACHED PURCHASE ORDER TERMS AND CONDITIONS