



City of Ontario

ADDENDUM NO. 4 Bid Invitation # 2006

D&C23-015 Anthony Munoz Gymnasium

Today's Date is Friday, September 11, 2026

The following changes, omissions, and/or additions to the specifications and/or drawings shall apply to proposals made for and to the execution of the various parts of the work affected thereby, and all other conditions shall remain the same.

Careful note of the Addendum shall be taken by all parties of interest so that the proper allowances may be made in strict accordance with the Addendum and that all trades affected shall be fully advised in the performance of the work which will be required of them.

In case of conflict between drawings, specifications, and the addendum, this Addendum shall govern. This Addendum shall be incorporated into the final Contract.

Clarification:

The following clarification is hereby made to the solicitation for the above project:

1. Due to the numerous questions surrounding the signage vendor, please find associated information for requirements which are a part of the General Requirements. The proposed signage vendor does need to submit qualifications prior to the Bid Q&A closing on September 14, 2026 by 5:00pm:
 - AMCC Gym Signage Bid Doc – General Requirements
 - Additional Instructions for new Signage Company Bidders

2. Due to clarifications with Bid Q&A, Architect has updated the Specifications for clarity purposes. The list of revisions is as follows:

SPECIFICATION REVISIONS

The following Specification sections have been modified as noted:

A) Replaced Table of Contents dated (9/8/26) in its entirety with the Table of Contents Dated (9/10/26) attached to this addendum.

- a. The Table of Contents has been updated to reflect the new date for the sections added, revised or replaced that are listed below.
- b. Changed date for the following sections from 7/13/26 to 9/10/26 to match the date of the section issued with this Addendum.
Includes Sections 01010, 01025, 01571, 01910, 02100, 06172, 07265, 07540, 12600, 15300 and 15400.

B) Revised Section 01010 Summary of the Work dated 7/13/26.

Revisions include:

- a. Changed date in header to 9/10/26.
- b. Revised Section 1.02 A - 4 - G and J.
- c. Revised Section 1.02 B - 1 and 2.

C) Revised Section 01025 Schedule of Values dated 7/13/26.

Revisions include:

- a. Changed date in header to 9/10/26.
- b. Division 7; Changed Single Ply Roofing to SBS – MB Membrane Roofing System
- c. Division 11; Removed the word “option” behind Wireless Mic.

D) Revised Section 01571 Stormwater Pollution Control Measures for Construction dated 7/13/26.

Revisions include:

- a. Changed date in header to 9/10/26.
- b. Revised Part 3 .B. 1: Replaced “Owner with assistance from Civil Engineer and Contractor” with “Contractor with assistance from Civil Engineer and Owner”.
- c. Revised Part 3 .B. 2: Replaced “Civil Engineer” with “Contractor”.
- d. Revised Part 3. B. 3a. Contractor to pay for the costs of plan checks, permits and inspections.

E) Revised Section 01910 General Commissioning Requirements dated 7/13/26.

Revisions include:

- a. Changed date in header to 9/10/26.
- b. Revised Section 1.08 A to include the Photovoltaic System

F) Revised Section 02100 Site Furnishings dated 7/13/26.

Revisions include:

- a. Changed date in header to 9/10/26.
- b. Revised header to have the correct specification section number.

G) Revised Section 06172 Metal-Web Wood Joists dated 7/13/26.

Revisions include:

- a. Changed date in header to 9/10/26.
- b. Revised header to have the correct specification section number.

H) Revised Section 07265 Vapor Emission Reduction System 7/13/26.

Revisions include:

- a. Changed date in header to 9/10/26.
- b. Revised Section 3.04 A - 1 to "10 tests per 1000 SF".

I) Revised Section 07540 SBS Modified Bituminous Membrane Roofing dated 7/13/26.

Revisions include:

- a. Changed date in header to 9/10/26.
- b. Revised header to have the correct specification section number.

J) Revised Section 12600 Telescoping Stands dated 7/13/26.

Revisions include:

- a. Changed date in header to 9/10/26.
- b. Revised header to have the correct specification section number.

K) Revised Section 15300 Automatic Fire Sprinklers Roofing dated 7/13/26.

Revisions include:

- a. Changed date in header to 9/10/26.
- b. Revised specifications to have the City of Ontario as the AHJ. Omitted all references to DSA.
- c. Added language in Section 1.07. A. 2 for Shop Drawing Submittal for Fire Sprinkler layout.

L) Revised Section 15400 Plumbing dated 7/13/26.

Revisions include:

- a. Changed date in header to 9/10/26.
- b. Revised header to have the correct specification section number.

V. ATTACHMENTS

1. Specifications Sections as listed under Specification Revisions

Acknowledgment of Receipt:

This Addendum must be acknowledged electronically, the bid management system will not perform submission of a bid until all addenda are acknowledged.

SEC. 1.00 GENERAL REQUIREMENTS

1.01 Preferred Sign Contractors

The work in this section must be provided by one of the following manufacturers:

SignGroup/Karman
9812 Independence Avenue
Chatsworth, CA 91311
Attn: Jack Minden
818-998-3636

Neiman & Company Architectural Signage
6842 Valjean Avenue
Van Nuys, CA 91406
Attn: Will Raskin
818-781-8600

TFN Architectural Signage
527 Fee Ana Street
Placentia, CA 92870
Attn: Cheryl Gilliam
714-556-0990

1.02 Description

- A. Sign components presented in this document are for Construction purposes only. Sign Contractor’s shop drawings shall be used as the final construction documents and shall include construction, engineering and installation details required for implementing the designs described herein.
- B. All designs shown herein shall be fabricated from the sign specification drawings bound herein, which shall control all visual proportions and details, colors, materials, and finishes, unless specifically noted otherwise. All structural details, fastenings, engineering, installations and other construction or fabrication methodology of a technical nature shall become the sole responsibility of the Sign Contractor and details for fabrication shall be presented as such via the Sign Contractor’s shop drawings.
- C. Upon award of the contract, designs shown herein shall be furnished by the Designer in an electronic format (Macintosh / Adobe Illustrator) to be utilized in the production of sign layouts and lettering. Final size adjustments (going from small drawings to full size sign layouts) shall be the responsibility of the Sign Contractor.
- D. The Sign Contractor shall be responsible for the quality of all materials and workmanship required for the execution of this contract, including materials and workmanship of any firms or individuals who act as his subcontractors. The Sign Contractor shall be responsible for providing subcontractors with complete and up-to-date drawings, specifications, sign schedules and information issued for this project.
- E. The Sign Contractor shall provide company history information, including photographic documentation of at least three completed projects of similar size, scope, components, materials and fabrication techniques.
- F. Principal work in this Section:

1. Fabricated aluminum monument sign with internally illuminated, push-thru acrylic letters.

2. Fabricated aluminum pylon sign with applied vinyl graphics.

3. Multi-layered aluminum pylon signs with applied vinyl graphics.

4. Aluminum plate sign panels mounted to rectangular aluminum posts.

5. Cut-out dimensional aluminum letters mounted to building.

6. Vinyl graphics applied to project entry glass and exterior door surface.

7. Painted aluminum sign backers with chemically etched metal sign faces with raised Braille /tactile and screen printed graphics.

8. Painted aluminum plate sign panels with applied vinyl graphics.

9. Fabricated aluminum cabinet with digital print site map and internal, concealed LED illumination.

10. Painted acrylic sign backers with chemically etched photopolymer sign faces with raised Braille/tactile and screen printed graphics.

11. Cut-out acrylic letters with painted finish mounted to interior casework surfaces.

12. Multi-layered acrylic sign panels with changeable paper inserts.

13. Painted acrylic sign panels with direct digital print or screen print graphics.

14. Fabricated aluminum stanchions with, non-glare, multi-layered acrylic sign faces with surface mask painted border to accommodate a changeable paper insert.

15. Fabricated aluminum blade signs with waterjet cut ball symbol and applied vinyl graphics.

16. All supplementary parts and components, hardware, mounting adhesives or other miscellaneous supports and materials required for a complete and thorough installation.

1.03 Work Included

Furnish labor, materials, equipment and services necessary and reasonably incidental to complete fabrication, installation and delivery of signs as specified. Sign Contractor shall provide all materials, equipment, services, labor, tools, and supplies to fulfill completion of this contract. Materials not specifically described but required for a complete and proper installation shall be provided by the Sign Contractor.

1.04 Samples and Submittals

- A. Submit the following qualifications with your bid: Identify three signage programs of similar size, scope and sign products. Identify which sign products will be manufactured in-house, and which products will be sub-contracted. Provide the name and address of the client project manager. Provide literature from your firm indicating your expertise and experience.
- B. Upon being awarded this project submit a production schedule indicating key project dates for meetings, submittal of shop drawings, samples, prototypes and site inspections. Verify with the owner any necessary permits and inspections required for this project.
- C. Submit the following samples and submittals in accordance with the project production / installation schedule.

1. Submit to Owner’s Representative, fully dimensioned shop drawings via email in PDF format of all sign types, clearly indicating construction materials and attachments for typical sign components and layouts showing number of lines of text or other unique configurations. Drawings shall show fabrication methods, finishes, anchorage, connections and other details of construction that are not shown in drawings herein. Shop drawings

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SECTION 01010

SUMMARY OF WORK

1.01 DESCRIPTION: The Work includes the Construction of:

**ANTHONY MUNOZ COMMUNITY CENTER GYMNASIUM
ONTARIO, CALIFORNIA**

in strict conformance with the Drawings and Specifications prepared by:

RCA+A
Robert R. Coffee Architect & Associates
183 McKellar Road
Dripping Springs, TX 78620
Telephone (949) 697-2326

A. The Project:

1. Project Title ; City of Ontario (RCA+A Project No. 2024.01).
2. Project Locations: 1242 West 4th Street, Ontario, CA 91762, as shown on the Vicinity Map in the Drawings.
3. Owner: City of Ontario, CA

1.02 WORK INCLUDED IN THE CONTRACT

A. The Work:

1. Demolition of some of the courtyard fencing, landscaping and paving adjacent to the existing Anthony Munoz Community Center and the adjacent site work as noted on the drawings (see Architectural and Civil Demolition Plans).
2. The Work will include all site preparation including demolition, site clearing and tree and shrub removal. Demolition shall be performed as per Section 02050. Demolition shall be performed with the requirement to separate recyclable materials that cannot be recycled. Refer to Section 01352 Construction Waste Management and Disposal.
 - a. The Work includes the removal of all existing "site culture" including but not limited to trees, fences, signs, light poles, gates, paving and other items noted on the Demolition Plans and within the Limit of Work.
3. The Work includes all new site work including hardscape and landscape, building elements, site walls and parking lot and exterior lighting as indicated in the Contract Drawings and Contract Specifications. The Work includes new utility systems, site paving, curbs, ramps, pavement markings, parking, signage, fences and gates, site lighting and other site features to extent indicated in the Contract Drawings.
4. The Work includes the construction of a new single story 21,900 +/-SF community center building. The Building is to be Type VB Fully-Sprinklered Construction. Additionally, the work includes the construction

of a trash enclosure, site walls and security gates. As indicated on the Drawings and in the Specifications, the Work Includes:

- a. New building structures including all exterior finishes, doors, windows, storefronts, curtainwall, covered walkway, interior finishes, casework, specialties and built-in equipment.
- b. All concrete paving, landscaping and irrigation system.
- c. Built-in Audio and Visual Equipment.
- c. Signage and Graphics to the extent indicated on the Drawings and in the Project Manual, Appendix A-Signage.
- d. Wet pipe fire suppression (sprinkler) system.
- e. Fire Detection and Alarm system.
- f. Plumbing and HVAC (heating, ventilating and air-conditioning) and electrical power and lighting and signal systems as indicated on the Plumbing, Mechanical and Electrical Drawings.
- g. Telephone equipment, conductors and telephone instruments see 1.02 B below.
- i. Additionally, other work under the building contact to include conduits, junction boxes, outlet boxes, backboards, conductors and conduit ties between backboards and in the Specifications, as indicated on Electrical Drawings.
- j. Security Cameras and Access Control System see 1.02 B below.
- k. All underground utilities.
- m. All work shown on Minor Off-Site Improvement Plan and Minor On-Site Improvement Plan.

B. Work Under Separate Contracts: The work includes coordination of work being performed by others under separate contracts with the City described in Article below titled "Concurrent Work Under Separate Contracts".

1. Telecommunication system: Work under separate contract will include telecommunication equipment, conductors and telephone and computer equipment. Any required electrical conduit and backboxes and pull-strings to be provided by the General Contractor and should be included in the electrical subcontractor's scope of work.
2. Security and Access Control: Work under separate contract will include Security Cameras and Access Control System. Electrical conduit and backboxes and pull-strings to be provided by the General Contractor and should be included in the electrical subcontractor's scope of work. Conduits shall be installed from the device location as shown on the drawings to the IT Control Room and Security Panel.
- 3.. Work under separate contracts shall include products not built into permanent construction, including:
 - a) Furniture, Fixtures and Equipment.

C. Environmental Considerations The proposed project has been designed and shall be constructed in compliance with the requirements of CCR Title 24, Part 11, 2022 California Green Building Standards Code (CALGreen Code) with July 2024 Supplement.

1. One of the perquisites for this certification is Construction Activity Pollution Prevention. In order to receive this credit the contractor must reduce pollution from construction activities by controlling soil erosion, waterway sedimentation and airborne dust generation.
2. The Contractor shall create and implement an Erosion and Sedimentation Control (ESC) Plan for all construction activities for the project.
3. Additional environmental considerations and scope of work are specified in Section 01352 – Construction Waste Management & Disposal, Section 01353 – Indoor Air Quality During Construction and Section 01571 – Stormwater Pollution Control Measures for Construction Activities.

D. Additional Information Available to Contractor:

1. **Appendix A:** Signage and Graphics Bid Package dated July 13, 2026.
2. **Appendix B:** Report of Geotechnical Study for the Proposed Anthony Munoz Community Center Gymnasium, 1242 West 4th Street, Ontario, CA, Kleinfelder Project No. 20236170.006A, dated June 24, 2024, Revised March 26, 2026.

E. Relationship to Work Under the Contract: Work under the contract shall include all provisions necessary to make such concurrent work under separate contracts complete in every respect and fully functional, including field finishing. Provide necessary backing, supports, piping, conduit, conductors and other such provisions from point of service to point of connection, as shown on Drawings and specified herein. Coordinate scheduling and sequencing of work under separate contracts with Construction Manager. See Section 01041 – Project Coordination for additional requirements.

1.03 CONSTRUCTION SEQUENCE AND SCHEDULING

A. Construction Sequence and Scheduling: Contractor shall coordinate on-site and off-site work to minimize traffic obstruction and interference with continuing activities on adjacent properties and thoroughfares. Sequence and scheduling of grading, paving and utility work, in particular, shall be coordinated with the City of Ontario.

1.04 PERMITS, LICENSES AND FEES

- A. Permits:** For Work included in the Contract, Contractor shall obtain all permits from Authority Having Jurisdiction (AHJ) and from serving utility companies and agencies.
- B. Permits:** A “No Fee Letter” will be provided to the General Contractor. No Building Permit Fees will be due by the General Contractor. Utility usage is not waived and is to be paid by the General Contractor for all temporary power and water.
1. Building permit: Contract Sum shall not include cost of building permits.
 2. Fire sprinkler system permits: For Work performed under design/build basis, Contract Sum shall include costs for plan check and permit fees charged by Authority Having Jurisdiction (AHJ), unless otherwise directed.

3. Fire detection and alarm system: Contract Sum shall include costs for plan check and permit fees charged by Authority Having Jurisdiction (AHJ), unless otherwise directed.
- A. Assessments:** Costs of assessments and connection fees shall not be included in the Contract Sum. Owner will pay all assessments and utility service connection fees.
- B. Licenses:** Contractor shall obtain and pay for all licenses associated with construction activities, such as business licenses, contractors' licenses and vehicle and equipment licenses. All costs for licenses shall be included in the Contract Sum.
- C. Test and Inspection Fees:**
1. Contractor shall pay all fees charged by City, County and special district authorities having jurisdiction and from serving utility companies and agencies, for tests and inspections conducted by those authorities, companies and agencies. Owner will reimburse Contractor for actual amount of such fees, without mark-up.
 2. Contractor shall pay for all additional charges by testing and inspection companies or agencies (including testing and inspection companies hired by owner to inspect the Work) due to the following:
 - a) Contractor's failure to properly schedule or notify the City of Ontario testing and inspection provider.
 - b) Changes in sources, lots or suppliers of products after original tests or inspections.
 - c) Changes in means, methods, techniques, sequences and procedures of construction that necessitate additional testing, inspection and related services.
 - d) Changes in mix designs for concrete and mortar after review and acceptance of submitted mix design.
 - e) Contractor submitted requests to change materials or products, which are accepted but require testing and/or re-inspection beyond original design.
 - f) Costs of travel and per diem to perform factory testing on sites over 50 miles from the jobsite.
 - g) Costs of re-inspection of re-testing work due to incomplete work or the failure in the original inspection or test.

END OF SECTION

SECTION 01025

SCHEDULE OF VALUES

PART 1 - GENERAL

- 1.01 DESCRIPTION: General Conditions and this Section cover schedule of values, supplementary to those given in the Conditions of the Contract.
- 1.02 SCHEDULE OF VALUES:
- A. Submit to Owner** for approval within 2 days of award of Contract, on the Owner Payment Request Form a breakdown to the total contract price showing the value assigned to each part of the work. List items in accordance with the specifications index.
 - B. Support Values** given with data substantiating their correctness upon Owner's request.
 - C. Use Schedule of Values** for Contractor's application for payment.
- 1.03 FORM OF SUBMITTAL: The form of Application for Payment shall be AIA G702 form acceptable to Owner. Use Table of Contents of this Specification for format and for listing costs of work specified in Specification Divisions 1 through 16 inclusive. Identify each line item using number and title as listed in the Table of Contents of these Specifications.
- 1.04 PREPARING SCHEDULE OF VALUES:
- A. Itemize Separate Line Item Cost** for each of the following general cost items:
 - 1. Performance and payment bonds.
 - 2. Field supervision and layout.
 - 3. Temporary facilities and controls.
 - 4. Allowances or budget for unforeseen or anticipated costs.
 - 5. Insurance costs.
 - B. Itemize Separate Line Cost** for work required by each Section of the Specifications.
 - C. Break Down** installed costs into:
 - 1. Delivered cost of product, with taxes paid.
 - 2. Total installed cost, with overhead and profit.
 - D. For Each Line Item** which has installed value of more than \$10,000.00, break down cost to list major products or operations under each item.
 - E. Round Off Figures** to nearest dollar.

- 1.05 REVIEW AND RESUBMITTAL: After review by Owner, revise and resubmit schedule (and schedule of material values) as required. Resubmit revised schedule in same manner.
- 1.06 BASE BID COST BREAKDOWN: (For information only--Award of this contract will be aggregate of all components formulating the Total Base Bid).

SCHEDULE OF VALUES FORM

DIVISION 01 General Requirements Dollars (\$_____)

DIVISION 02 Site Work. Dollars (\$_____)

Demolition \$_____

Grading \$_____

Underground Utilities \$_____

Landscaping and Irrigation \$_____

Paving \$_____

DIVISION 03 Concrete Dollars (\$_____)

DIVISION 04 Masonry. Dollars (\$_____)

Costs associated with Work specified in the following Sections:

CMU \$_____

DIVISION 05 Metals Dollars (\$_____)

Costs associated with Work specified in the following Sections:

Structural Steel \$_____

Ornamental Metal \$_____

DIVISION 06 Carpentry. Dollars (\$_____)

Costs associated with Work specified in the following Sections:

Rough Carpentry (incl. GluLams) \$_____

Finish Carpentry \$_____

DIVISION 07 Moisture

Dollars (\$_____)

Costs associated with Work specified in the following Sections:

Metal Wall Panels \$_____

SBS-MB Membrane Roofing Systems \$_____

DIVISION 08 Doors and Windows.

Dollars (\$_____)

Costs associated with Work specified in the following Sections:

HM Doors and Frames \$_____

Aluminum Storefront/Curtainwall/Entrances \$_____

Glass and Glazing \$_____

DIVISION 09 Finishes

Dollars (\$_____)

Costs associated with Work specified in the following Sections:

Lath and Plaster \$_____

Gypsum Wallboard \$_____

Acoustical Ceilings \$_____

Linear Wood Ceilings \$_____

Porcelain Wall and Floor Tile \$_____

Resilient Flooring \$_____

Cushioned Wood Flooring \$_____

Carpet \$_____

Painting \$_____

Wallcoverings \$_____

DIVISION 10 Specialties.

Dollars (\$_____)

Costs associated with Work specified in the following Sections:

Toilet Partitions and Accessories \$_____

Louvered Sunshades \$_____

DIVISION 11 Equipment. Dollars (\$_____)

Costs associated with Work specified in the following Sections:

- Gymnasium Equipment \$_____
- Base Audio / Video Systems \$_____
- Fitness Room Wireless Microphone \$_____

DIVISION 12 Furnishings. Dollars (\$_____)

Costs associated with Work specified in the following Sections:

- Telescoping Stands \$_____

DIVISION 15 Mechanical Dollars (\$_____)

Costs associated with Work specified in the following Sections:

- Fire Sprinklers \$_____
- HVAC \$_____
- Plumbing \$_____

DIVISION 16 Electrical Dollars (\$_____)

Costs associated with Work specified in the following Sections:

- Electrical Power and Signal Infrastructure \$_____
- Lighting \$_____

APPENDIX A SIGNAGE AND GRAPHICS Dollars (\$_____)

SUBTOTAL	Dollars (\$_____)
Overhead and Profit.	Dollars (\$_____)
Base Bid Total	Dollars (\$_____)
TOTAL	Dollars (\$_____)

END OF SECTION

SECTION 01571

**STORMWATER POLLUTION CONTROL MEASURES
FOR CONSTRUCTION ACTIVITIES**

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Implementation and monitoring of Storm Water Pollution Prevention Plan (SWPPP) for the purpose of preventing the discharge of pollutants from the construction site into the receiving waters. This includes the elimination of pollution discharges such as improper dumping, spills or leakage from storage tanks or transfer areas.
- B. Certification that the construction project has met all of the conditions of the General Construction Activity Storm Water Permit (GCASP).

1.2 RELATED SECTIONS

- A. Section 01352 - Sustainable Design Requirements: General requirements for submission of documentation of compliance with sustainable design requirements.

1.3 REFERENCES

- A. Stormwater Best Management Practice Handbook (BMP Handbook), Construction Edition, as published by the California Storm Water Quality Association. Available at www.cabmaphandbooks.com.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with Storm Water Pollution Prevention Plan.
- B. Maintain one copy of document on site.

1.5 REGULATORY REQUIREMENT

- A. Prior to the beginning of construction on this site the owner will file with the State of California, State Water Resources Control Board a Notice of Intent (N.O.I.) that this project will comply with the terms of the State Water Resources Control Board's latest Order and the latest National Pollutant Discharge Elimination System (NPDES) General Permit Waste Discharge Requirements (WDRs) for discharge of storm water run-off associated with construction activity to include erosion and sediment control.
- B. Comply with requirements of the State's General Permit with regard to the implementation and maintenance of the SWPPP.

1.6 PERFORMANCE REQUIREMENTS

- A. The Storm Water Pollution Prevention Plan is a minimum requirement. Revisions and modifications to the SWPPP are acceptable only if they maintain levels of protection equal to or greater than originally specified.
- B. Read and be thoroughly familiar with all of the requirements of the SWPPP

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- C. Inspect and monitor all work and storage areas for compliance with the SWPPP prior to any anticipated rain.
 - D. Complete any and all corrective measure as may be directed by the regulatory agency.
 - E. Penalties: Pay any fees and be liable for any other penalties that may be imposed by the regulatory agency for non-compliance with SWPPP during the course of work.
 - F. Costs: Pay all costs associated with the implementation of the requirements of the SWPPP in order to maintain compliance with the Permit. This includes installation of all Housekeeping BMPs, General Site and Material Management BMPs, Bi-weekly Inspection requirements, maintenance requirements, and all other requirements specified in the SWPPP.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Use materials of a class, grade and type needed to meet the performance described in the BMP Handbook.

PART 3 - EXECUTION

- A. Erosion and Sedimentation Control, General: In order to prevent erosion, ensure that sediment-laden water does not enter drainage systems and to provide runoff controls to prevent siltation on site and on adjacent properties, a project-specific Storm Water Pollution Protection Plan (SWPPP) will be prepared. Contractor shall comply with requirements of the SWPPP.
- B. Storm Water Pollution Protection Plan (SWPPP):
 - 1. Contractor with assistance from Civil Engineer and Owner, will prepare a Notice of Intent (NOI) for submission to the California Regional Water Quality Control Board (CRWQCB) in compliance with the State General Construction Activity Storm Water Permit (Storm Water Permit).
 - 2. Contractor will prepare and submit to Authority Having Jurisdiction (AHJ) a Storm Water Pollution Protection Plan (SWPPP). The SWPPP will comply with California Storm Water Best Management Practice Handbook for Construction Activity (BMP Handbook), current Edition, and as specified below.
 - 3. Contractor shall secure approval and permits from Authority Having Jurisdiction (AHJ).
 - a. Costs of plan-checks, permits and inspections will be paid by Contractor.
 - b. Implementation of SWPPP by Contractor shall be included in Contract Time and Contract Sum.
 - 4. Erosion and sedimentation control provisions shall meet or exceed minimum requirements of Authority Having Jurisdiction (AHJ) and California State Water Resources Control Board (SWRCB). When provisions are indicated on Drawings, they are minimum requirements. See Civil Drawings for additional requirements and details.
 - 5. Erosion and sedimentation control provisions shall be developed and implemented prior to commencing site clearing, grading, backfilling and compacting or other construction activities which will expose soil to erosion and potential for sediment-laden runoff. The SWPPP will also include provisions for monitoring and sampling of sediment and storm water constituents during storm events, as required in the Construction Permit.
- C. Contractor's Responsibilities under the Storm Water Pollution Protection Plan (SWPPP):

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1. Contractor shall implement and maintain erosion and sedimentation control provisions of the SWPPP, including amendments as directed to reflect actual construction practices. As construction progresses and seasonal conditions dictate, more erosion and sedimentation controls may be required. If so, Contractor shall provide additional provisions over and above minimum requirements as necessary.
 2. The Contractor is hereby notified that specific construction practices in Section 7, "Responsibilities of the Contractor," of the Standard Specifications for Public Works Construction ("Green Book"), are considered to be Best Management Practices. Applicable construction practices in the Standard Specifications will be incorporated into the SWPPP.
 3. It is the requirement of the State General Construction Activity Storm Water Permit that the SWPPP include a maintenance schedule for Best Management Practices (BMPs) installed during construction designed to reduce or eliminate pollutants after construction is completed (post construction BMPs).
 4. The SWPPP document shall not be construed to be a waiver of the Contractor's obligation to review and understand the State General Construction Activity Storm Water Permit before submitting a bid. By submitting a bid, the Contractor acknowledges that he has read and understands the requirements of the State General Construction Activity Storm Water Permit.
 5. Erosion control according to the SWPPP may include but not be limited to dikes, basins, ditches, gravel bags, sand bags, silt fence, inlet filter fabric, and application of approved straw and seed which might become necessary as a result of operations. Contractor shall maintain previously installed erosion control facilities.
 6. Dewatering according to the SWPPP may include but not be limited to pumping water and desilting waters after each storm event.
 7. As permanent storm water drainage systems and landscaping are completed, and with approval of Authority Having Jurisdiction (AHJ), Contractor shall remove all runoff control and measures in preparation for Substantial Completion review, unless otherwise directed by the Construction Manager.
 8. Implementation, maintenance, replacement and additions to erosion and sedimentation control provisions shall continue until Substantial Completion review is completed for landscaping, or sooner if approved by Authority Having Jurisdiction (AHJ).
 9. All fines and costs for remedial work related to Contractor's failure to comply with SWPPP and to maintain erosion and sedimentation controls shall be reimbursed by Contractor to owner by deductive Change Order.
 10. A copy of the SWPPP shall be available at the construction site at all times. The NOI, SWPPP forms, and the Storm Water Permit (which can be downloaded from the following website: <http://www.swrcb.ca.gov/stormwtr/construction.html>).
- D. Runoff Control: Surface runoff and other waters may be encountered at various times during construction. Contractor, by signing the Agreement, acknowledges that risks arising from surface runoff and other waters have been investigated and considered, and Contract Sum and Contract Time include all costs associated with runoff control.
1. It shall be responsibility of Contractor to protect Work from detrimental effects of all waters encountered.
 2. It shall be responsibility of Contractor to protect Work from detrimental effects of runoff.

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3. Should damage to the Work due to surface or other water occur prior to acceptance of the Work by the County or owner, Contractor shall repair or replace Work at no change in Contract Time or Contract Sum.
- E. Drainage: Grade site and other Work areas to drain and protect Work areas from erosion and damage from accumulated water (ponding and flooding).
1. Provide temporary drainage ditches and diversion measures as necessary to protect construction.
 2. Provide erosion control measures as necessary and as required by Authority Having Jurisdiction (AHJ). Comply with local water quality control requirements, as applicable.
 3. Due to the site's ever-changing condition during construction, erosion protection shall be achieved by implementing Best Management Practices (BMPs).
- F. De-Watering: Maintain excavations free of water. Provide and operate pumping equipment as necessary.
1. Removal of contaminated water from excavations, dewatering of contaminated groundwater and discharging of contaminated soils via surface erosion is prohibited.
 2. Dewatering of non-contaminated groundwater shall be performed only after Contractor obtains a National Pollutant Discharge Elimination System Permit from the State or Regional Water Quality Control Board having authority. Costs of such permit shall be included in the Contract Sum.
- G. Water Pollution Control (NPDES Compliance): Contractor shall comply with California Stormwater Best Management Practice Construction (BMP) Handbook available for free at <http://www.cabmphandbooks.com>.
1. Contractor shall implement and maintain all appropriate BMPs necessary or as required by Authority Having Jurisdiction (AHJ) to eliminate illicit discharges, prevent potential illicit discharges, and prevent debris/dirt/trash, etc. from entering drainage systems.
 2. Drainage inlets and/or catch basins within the construction work area and immediately adjacent to the work area shall be protected at all times with appropriate BMPs to prevent debris/dirt/trash, etc from entering said devices.
 3. Do not discharge any water into the storm drain system, gutter, street, creek or to any other area which ultimately may allow the water to migrate to the storm drain system. Comply with Section 7-8 "Project Site Maintenance" of the Standard Specifications for Public Works Construction.
 4. In addition, listed below are BMPs related to common construction activities that shall be utilized:
 - a. Concrete and Mortar Products:
 - 1) The Contractor shall prevent the discharge of pollutants into storm water or storm water systems from concrete waste by conducting washouts at appropriate off-site locations, performing on-site washouts in a designated area, and providing appropriate training for employees and subcontractors.
 - 2) The Contractor shall store and mix dry and wet materials either off-site or under cover, away from drainage areas.
 - 3) For washout of concrete trucks, the Contractor shall provide appropriate off-site locations or designated contained areas at least 50 feet away from storm drains, open ditches, streets, or streams.
 - 4) The Contractor shall prevent run-off from designated washout areas by constructing a temporary pit or bermed area large enough to handle all produced liquid and solid

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- waste. When concrete sets, break up and dispose of concrete in construction fills per direction of the soils engineer or dispose of it as solid waste and/or recycle.
- 5) The Contractor shall inform concrete suppliers and subcontractors of the designated washout locations and disposal sites for concrete and mortar products and shall be responsible for ensuring that all workers use it appropriately.
 - b. Asphalt and Bituminous Products: The Contractor shall prevent the discharge of pollutants from asphalt and bituminous operations by preventing run-on and run-off of water during paving operations and providing appropriate training for employees and subcontractors. In addition, the Contractor shall:
 - 1) Avoid prime or tack coating during wet weather.
 - 2) Store materials away from drainage courses.
 - 3) Cover catch basins and manholes when applying seal coat, tack coat, slurry seal, fog seal, etc.
 - 4) Make sure sand or gravel placed over new asphalt does not wash into storm drains, streets, or creeks.
 - 5) Dispose of old asphalt properly and collect and remove all broken asphalt from the site and recycle whenever possible.
 - 6) Not dispose of asphalt products into waterways.
 - 7) Follow the storm water permitting requirements for industrial activities if paving involves an on-site mixing plant.
 - c. Construction Water: The Contractor shall eliminate excessive construction water that may cause erosion and carry pollutants from the site. In addition, the Contractor shall:
 - 1) Use construction water conservatively.
 - 2) Whenever possible, dispose of excess water on-site by allowing it to soak into the ground.
 - d. Sawcutting Water Runoff: Sawcutting water runoff contains pollutants that must be contained and disposed of properly. The Contractor shall:
 - 1) Prevent sawcut water runoff from entering catch basins, manholes, and storm drains.
 - 2) Direct water into a temporary pit and dispose of the water by vacuuming the water into a truck and removing the water from the site.
 - 3) Place drip pans or absorbent materials under sawcutting equipment when not in use.
 - 4) Clean up spills with absorbent materials rather than burying. Dispose of absorbent material properly.
 - e. Housekeeping/Cleanup: The Contractor shall prevent pollution of storm water from clean-up and disposal operations by using good housekeeping methods.
 - 1) When fluids or dry materials spill, clean-up should be immediate, thorough, and routine. The Contractor shall never attempt to "wash them away" with water or bury them.
 - 2) The Contractor shall report significant spills to the appropriate spill response agencies immediately.
 - 3) The Contractor shall recognize that different types of materials have different disposal requirements and follow appropriate practices.
 - 4) The Contractor shall confine non-hazardous debris to dumpsters, covered at night or during wet weather, and take the debris to a landfill for recycling or disposal.
 - 5) The Contractor shall handle hazardous debris in accordance with specific laws and regulations and dispose of them properly. A separate permit may be required. Common hazardous debris found on construction sites are: Liquid residues from paints, thinners, solvents, glues, and cleaning fluids; leaching agents from lumber such as formaldehyde, arsenic, copper, creosote, and chromium; motor oil; gear oil; antifreeze fluids; brake fluids; etc.; and unused pesticides.
 - f. Sanitary Waste Management: The Contractor shall prevent the discharge of sanitary waste into storm water systems by providing convenient, properly located, well-maintained facilities.
 - 1) The Contractor shall hire a licensed portable sanitary facility leasing company, which will clean the facilities regularly and keep them in good working order.

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- 2) The Contractor shall make sure that portable sanitary facilities are located on relatively level ground away from traffic areas, drainage courses, storm drain courses, and storm drain inlets and install protective BMPs where appropriate.
 - 3) The Contractor shall regularly inspect the facilities for any leaks, and have defective units replaced.
- g. Vehicle and Equipment Management:
- 1) The Contractor shall use and maintain construction vehicles and equipment in a manner that prevents leaks and spills of fluids, contains wash waters, and controls off-site tracking.
 - a) The Contractor shall not allow leaking vehicles and equipment on-site and shall inspect equipment and vehicles frequently for leaks and repair them immediately.
 - b) The Contractor shall clean up spills and leaks promptly with absorbent materials, and shall not flush said spills with water.
 - 2) The Contractor shall fuel, maintain, and repair vehicles and equipment off-site whenever possible, and on-site only in designated areas. The Contractor shall prevent run-on and run-off from designated areas and provide cover as well as containment devices as necessary.
 - 3) The Contractor shall wash vehicles and equipment on-site in designated, contained areas, allowing wash waters to infiltrate into the ground. The Contractor shall use phosphate-free, biodegradable soaps, and limit steam cleaning to confined areas only.
 - 4) When not in use, the Contractor shall store equipment and vehicles in designated, contained areas and place drip pans and absorbent material under stored equipment that is prone to leaking and dripping (e.g., paving equipment).
 - 5) If the Contractor must drain and replace motor oil, radiator coolant, or other fluids on-site, use drip pans or drop cloths to catch drips and spills and have appropriate spill containment devices in place.
 - a) The Contractor shall collect all spent fluids, store in separate containers, and recycle whenever possible.
 - b) Note: For recycling purposes, such liquids must not be mixed with other fluids. Non-recycled fluids generally must be disposed of as hazardous waste.
- h. Surface and Subsurface Water Control:
- 1) The Contractor shall prevent the discharge of pollutants into storm water or storm water systems as a result of surface and subsurface water control operations by using the following methods:
 - 2) For surface water control operations where the flow is routed to bypass the construction area, establish stable (erosion resistant) conveyance routes for the diverted flow. Trap any significant sediment (e.g., mud) generated by the rerouted flow in a sediment trap, filtering berm, or basin or other approved BMP.
 - 3) In subsurface pumping or other subsurface water control operations where significant amounts of sediment (e.g., mud) are present in the removed water, capture the sediment in a sediment trap, filtering berm, or basin or other approved BMP.
 - 4) If a sediment trap or basin is required for the surface or subsurface water control operations, the facility should be designed such that the sediment is settled or trapped in the facility prior to discharging of the water.
 - 5) In areas suspected of groundwater pollution, sample the groundwater near the excavation/pumping site and have the water tested for known or suspected pollutants at a certified laboratory.
 - 6) Any proposed discharge of groundwater may be subject to requirements of the Regional Water Quality Control Board.

3.1 IMPLEMENTATION OF SWPPP

A. Implementation of SWPPP:

1. Install perimeter controls prior to starting other construction work at the site.

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2. Contain on-site storm water at the jobsite. Do not drain on-site water directly into the storm drain.
 3. Designate trained personnel for the proper implementation of the SWPPP.
 4. Revise SWPPP to suit changing site conditions and also when properly installed systems are ineffective.
- B. Termination of SWPPP: At the end of Construction Contract:
1. Leave in place storm water pollution prevention controls needed for post-construction storm water management and remove those that are not needed as determined by Construction Manager. Thereafter, left-in-place controls will be maintained by the County and/or owner.
 2. Provide Site Monitoring Reports, SWPPP revisions, Compliance Certifications and related documents to Construction Manager. Post-construction storm water operation and management plan as mentioned in the compliance certifications are considered to be in place at the end of the Construction Contract.
- C. Monitoring: Conduct examination of storm water pollution prevention controls monthly, as well as before and after each storm and each 24-hour period during extended storm events. Prepare and maintain, at the jobsite, a log of each inspection using Site Monitoring Report forms.
- D. Liabilities and Penalties: Review of the SWPPP and inspection log by Construction Manager and owner's Civil Engineer shall not relieve the Contractor from liabilities arising from non-compliance of storm water pollution regulations.
1. Payment of penalties for non-compliance by the Contractor shall be the sole responsibility of the Contractor and will not be reimbursed by the owner.
- E. Clean Water Act: Compliance of the Clean Water Act pertaining to construction activity is the sole responsibility of the Contractor. Any fine(s) levied against the owner due to non-compliance by the Contractor, the owner will deduct from the final payment due the Contractor the total amount of the fine(s) levied on the owner, plus legal and associated costs.

3.2 CHANGE OF INFORMATION

- A. Changes in SWPPP: Submit to the Construction Manager a completed NOI for change of information (Construction Site Information and Material Handling/Management Practices).

END OF SECTION

SECTION **01910**

GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. OPR and BOD** documentation are included by reference for information only.

1.2 SUMMARY

A. This section includes:

1. Commissioning: Commissioning is a systematic process of ensuring that all building systems perform interactively according to the design intent and the Owner's operational needs. This is achieved by beginning in the design phase and documenting design intent and continuing through construction, acceptance, and the warranty period with actual verification of performance. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training.
2. Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:
 - a. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
 - b. Verify and document proper performance of equipment and systems.
 - c. Verify that O&M documentation left on site is complete and that it satisfies a comprehensive Systems Manual
 - d. Verify that the Owner's operating personnel are adequately trained.
3. The commissioning process does not take away from or reduce the responsibility of the Contractor to meet the Contract Documents.

B. Related Sections:

1. Section 15600 Plumbing
2. Section 15800 Heating Ventilation and Air Conditioning
3. Section 16010 General Electrical Provisions
4. Section 16500 Lighting Fixtures and Controls

1.3 DEFINITIONS

- A. Acceptance Phase:** Phase of construction after startup and initial checkout when functional performance tests, O&M documentation review, and training occur

- B. **Approval:** Acceptance that a piece of equipment or system has been properly installed and is functioning in the tested modes according to the Contract Documents
- C. **Architect / Engineer (A/E):** The prime consultants who comprise the design team, generally the HVAC mechanical designer/engineer and the electrical designer/engineer
- D. **Owner's Project Requirements:** The Owner's Project Requirements is the documentation of the primary thought processes and assumptions behind design decisions that were made to meet the design intent. The Owner's Project Requirements describes the systems, components, conditions, and methods chosen to meet the intent. Some reiterating of the design intent may be included.
- E. **Basis of Design:**
- F. **Commissioning Authority (CxA):** An independent authority, not otherwise associated with the A/E team members or the Contractor, though he/she may be hired as a subcontractor to them. The CxA directs and coordinates the day-to-day commissioning activities. The CxA does not take an oversight role.
- G. **Commissioning Plan:** An overall plan, developed before or after bidding that provides the structure, schedule, and coordination planning for the commissioning process
- H. **Construction Checklist (CC):** A list of items to inspect and elementary component tests to conduct to verify proper installation of equipment. Construction checklists are primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g., belt tension correct, oil levels OK, labels affixed, gages in place, sensors calibrated, etc.). However, some construction checklist items entail simple testing of the function of a component, a piece of equipment, or system (such as measuring the voltage imbalance on a three-phase pump motor of a chiller system). The word construction refers to before functional testing. Construction checklists augment and are combined with the manufacturer's start-up checklist. Even without a commissioning process, Contractors typically perform some, if not many, of the construction checklist items a commissioning authority will recommend. However, few Contractors document in writing the execution of these checklist items. Therefore, for most equipment, the Contractors execute the checklists on their own. The CxA only requires that the procedures be documented in writing and does not witness the completion of construction checklists, except for larger or more critical pieces of equipment.
- I. **Contract Documents:** The documents binding on parties involved in the construction of this Project (drawings, specifications, change orders, amendments, contracts, Cx Plan, etc.)
- J. **Contractor:** The general contractor or authorized representative
 - 1. **Control system:** The central building energy management control system
- K. **Data Logging:** Monitoring flows, currents, status, pressures, etc. of equipment using stand-alone data loggers separate from the control system

- L. Deferred Functional Tests:** FTs that are performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design, or other site conditions that prevent the test from being performed
- M. Deficiency:** A condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents
- N. Design Intent:** A dynamic document that provides the explanation of the ideas, concepts, and criteria that are considered to be very important to the owner. It is initially the outcome of the programming and conceptual design phases.
- O. Factory Testing:** Testing of equipment on-site or at the factory by factory personnel with a Project Manager present
- P. Functional Performance Test (FT):** Test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint). Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The systems are run through all the control system's sequences of operation, and components are verified to be responding as the sequences state. Traditional air or water test and balancing (TAB) is not functional testing, in the commissioning sense of the word. TAB's primary work is setting up the system flows and pressures as specified, while functional testing is verifying that which has already been set up. The Commissioning Authority develops the functional test procedures in a sequential written form, coordinates, oversees, and documents the actual testing, which is usually performed by the installing Contractor or vendor. FTs are performed after construction checklists and startup are complete.
- Q. General Contractor (GC):** The Contractor for this project. Generally refers to all the GC's subs as well. Also referred to as the Contractor, in some contexts.
- R. Indirect Indicators:** Indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100% closed
- S. Installing Contractor (IC):** Contractor who installs specific equipment and/or systems
- T. Manual Test:** Using hand-held instruments, immediate control system readouts, or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation")
- U. Monitoring:** The recording of parameters (flow, current, status, pressure, etc.) of equipment operation using data loggers or the trending capabilities of control systems
- V. Non-Compliance:** See Deficiency
- W. Non-Conformance:** See Deficiency
- X. Over-written Value:** Writing over a sensor value in the control system to see the response of a system (e.g., changing the outside air temperature value from 50°F to 75°F to verify economizer operation). See also "Simulated Signal."

- Y. Owner-Contracted Tests:** Tests paid for by the Owner outside the GC's contract and for which the CA does not oversee. These tests will not be repeated during functional tests if properly documented.
- Z. Phased Commissioning:** Commissioning that is completed in phases (by floors, for example) due to the size of the structure or other scheduling issues, in order minimize the total construction time
- AA. Sampling:** Functionally testing only a fraction of the total number of identical or near-identical pieces of equipment. Refer to Part 3.4 F for details.
- BB. Seasonal Performance Tests:** FTs that are deferred until the system(s) will experience conditions closer to their design conditions
- CC. Simulated Condition:** Condition that is created for the purpose of testing the response of a system (e.g., applying a hair blower to a space sensor to see the response in a VAV box)
- DD. Simulated Signal:** Disconnecting a sensor and using a signal generator to send an amperage, resistance, or pressure to the transducer and DDC system to simulate a sensor value
- EE. Specifications:** The construction specifications of the Contract Documents
- FF. Startup:** The initial starting or activating of dynamic equipment, including executing construction checklists
- GG. Subs:** The subcontractors to the Prime Contractor who provide and install building components and systems
- HH. Test Procedures:** The step-by-step process that must be executed to fulfill the test requirements. The CA develops the test procedures.
- II. Test Requirements:** Requirements specifying what modes and functions, etc. shall be tested. The test requirements are not the detailed test procedures. The test requirements for each system are specified in the respective section of the Contract Documents.
- JJ. Trending:** Monitoring using the building control system
- KK. Variable Refrigerant Flow (VRF):** Is a ductless multi-split system with multiple indoor fan coil units receiving direct refrigerant that is also connected to single condenser unit located on the roof. Simultaneous heating and cooling can be controlled with these units via a multi-zone controls strategy. These VRF system can be complex and require installation by an approved installing contractor and start-up verification from an authorized manufacturer's representative.
- LL. Vendor:** Supplier of equipment
- MM. Warranty Period:** Warranty period for entire project, including equipment components. Warranty begins at Substantial Completion and extends for at least one year, unless specifically noted otherwise in the Contract Documents and accepted submittals.

1.4 COMMISSIONING TEAM

- A. Members Appointed by Contractor(s):** Individuals, each having the authority to act on behalf of the entity he or she represents, explicitly organized to implement

the commissioning process through coordinated action. The commissioning team shall consist of, but not be limited to, representatives of Contractor, including Project superintendent and subcontractors, installers, manufacturer's representatives, suppliers, and specialists deemed appropriate by the CxA.

B. Members Appointed by City:

1. Representatives of the facility user and operation and maintenance personnel.
2. Architect, engineering design, and CxA professionals.

1.5 CITY'S RESPONSIBILITIES

- A. Provide the OPR** documentation to the CxA and Contractor for information and use.
- B. Assign operation and** maintenance personnel and schedule them to participate in commissioning team activities.
- C. Provide the BOD documentation**, prepared by Engineer and approved by City, to the CxA and Contractor for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

1.6 CONTRACTOR'S RESPONSIBILITIES

- A. Contractor shall assign representatives** with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:
1. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
 2. Cooperate with the CxA for resolution of issues recorded in the Issues Log.
 3. Attend commissioning team meetings.
 4. Integrate and coordinate commissioning process activities with construction schedule and installing contractors.
 5. Review and accept construction checklists provided by the CxA.
 6. Provide for VRF system manufacturer support including pre-functional start-up assistance and support integrating VRF controls with the overall building management system.
 7. Complete construction checklists as Work is completed and provide to the Commissioning Authority on a monthly basis.
 8. Review and accept commissioning process test procedures provided by the Commissioning Authority.
 9. Complete commissioning process test procedures.

1.7 CxA's RESPONSIBILITIES

- A. Organize and** lead the commissioning team.

- B. Provide** commissioning plan.
- C. Convene commissioning** team meetings.
- D. Provide Project-specific** construction checklists and commissioning process test procedures.
- E. Verify the execution of** commissioning process activities using random sampling. Verification will include, but is not limited to, equipment submittals, construction checklists, training, operating and maintenance data, tests, and test reports to verify compliance with the OPR. When a random sample does not meet the requirement, the CxA will report the failure in the Issues Log.
- F. Prepare and** maintain the Issues Log.
- G. Witness systems,** assemblies, equipment, and component startup.
- H. Compile test data, inspection reports, and certificates;** include them in the systems manual and commissioning process report.

1.8 SYSTEMS TO BE COMMISSIONED

- A. The following systems are to be commissioned where applicable per the plans and specifications:**
 - 1. HVAC and controls.
 - 2. Lighting and controls
 - 3. Domestic hot water heating
 - 4. Newly installed irrigation controller (if any) for CALGreen compliance.
 - 5. Photovoltaic System.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. All standard testing equipment** required to perform startup and initial checkout and required functional performance testing shall be provided by the IC for the equipment being tested. For example, the MC of Division 15 shall ultimately be responsible for all standard testing equipment for the HVAC system and controls system in Division 15, except for equipment specific to and used by TAB in their commissioning responsibilities. The IC shall provide two-way radios, if needed during functional testing.
- B. Special equipment, tools** and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment, according to these Contract Documents, shall be included in the base bid price to the Contractor and left on site, except for stand-alone data logging equipment that may be used by the CA.
- C. Refer to Part 3 for details** regarding equipment that may be required to simulate required test conditions.

PART 3 - EXECUTION

3.1 MEETINGS

- A. Commissioning Meeting:** Within 60 days of commencement of construction, the CxA will schedule, plan and conduct a commissioning meeting with the entire commissioning team in attendance. Meeting minutes will be distributed to all parties by the CxA. Information gathered from this meeting will allow the CxA to revise the Commissioning Plan, which will be distributed to all parties.
- B. Miscellaneous Meetings:** Other meetings will be planned and conducted by the CxA as construction progresses. These meetings will cover coordination, deficiency resolution and planning issues with particular contractors. The CxA will plan these meetings and will minimize unnecessary time being spent by contractors. For large projects, these meetings may be held monthly, until the final 3 months of construction when they may be held as frequently as one per week.

3.2 STARTUP, CONSTRUCTION CHECKLISTS, AND INITIAL CHECKOUT

- A. The following procedures** apply to all equipment to be commissioned. Some systems that are not comprised so much of actual dynamic machinery, e.g., electrical system power quality, may have very simplified CCs and startup.
- B. General:** Construction checklists are important to ensure that the equipment and systems are hooked up correctly and operational. Checklists also ensure that functional performance testing (in-depth system checkout) may proceed without unnecessary delays. Each piece of equipment receives full construction checkout. No sampling strategies are used. The construction testing for a given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of the given system.
- C. VRF System Specifics:** Special attention must be given to a VRF system components and general workmanship to provide the owner with a warranted and long lasting system. Some of the issues that can affect performance and verification in the field include but are not limited to the following
 - 1. Refrigerant piping installation and leak detection
 - 2. Branch controller(s) location and installation
 - 3. System controls integration with overall building management system
 - 4. Access of fan coil units for maintenance and filter change outs
- D. Startup and Initial Checkout Plan:** The CxA will assist the commissioning team members responsible for startup of any equipment in developing detailed startup plans for all equipment. The primary role of the CxA in this process is to ensure that there is written documentation that each of the manufacturer-recommended procedures has been completed. Parties responsible for construction checklists and startup are identified in the initial commissioning meeting and in the checklist forms.
 - 1. The CxA adapts, if necessary, the representative construction checklists and procedures from the related sections. These checklists indicate

required procedures to be executed as part of startup and initial checkout of the systems and the party responsible for their execution.

2. The CxA provides these checklists and tests to the Contractor. The Contractor determines which trade is responsible for executing and documenting each of the line item tasks and notes that trade on the form. Each form will have more than one trade responsible for its execution.
3. The Contractor responsible for the purchase of the equipment develops the full startup plan by combining (or adding to) the CxA's checklists with the manufacturer's detailed startup and checkout procedures from the O&M manual and the normally used field checkout sheets. The plan will include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan.
 - a. The full startup plan could consist of something as simple as:
 - 1) The CxA's construction checklists
 - 2) The manufacturer's standard written startup procedures copied from the installation manuals with check boxes by each procedure and a signature block added by hand at the end
 - 3) The manufacturer's normally used field checkout sheets and any special testing and forms used by the authorized manufacturer's representative.
4. The contractor submits the full startup plan to the CxA for review and approval.
5. The CxA reviews and approves the procedures and the format for documenting them, noting any procedures that need to be added.

E. Sensor and Actuator Calibration

1. All field-installed temperature, relative humidity, CO, CO₂ and pressure sensors and gages, and all actuators (dampers and valves) on all equipment shall be calibrated using the methods described below. Alternate methods may be used if approved by the CxA beforehand. All test instruments shall have had a certified calibration within the last 12 months. Sensors installed in the unit at the factory with calibration certification provided need not be field-calibrated.
2. The VRF manufacturer's authorized representative along with the installing contractor observe and record system's refrigerant suction and pressure conditions.
3. All procedures used shall be fully documented on the construction checklists or other approved forms, clearly referencing the procedures followed and written documentation of initial, intermediate, and final results.

F. Execution of Construction Checklists and Startup

1. Four weeks prior to startup, the contractors and vendors schedule startup and checkout with the GC and CxA. The performance of the construction checklists, startup and checkout are directed and executed by the contractor or vendor. When checking off construction checklists, signatures may be required of other contractors for verification of completion of their work.
2. The CxA will, at their own discretion, observe, at minimum, the procedures for each piece of primary equipment unless there are multiple units. In no case will the number of units witnessed be less than four on any one building, nor less than 20% of the total number of identical or very similar units.
3. For lower-level components of equipment, (e.g., VAV boxes, sensors, controllers), the CxA shall observe a sampling of the construction and startup procedures. The sampling procedures are identified in the Commissioning Plan.
4. The contractors shall execute startup and provide the CxA with a signed and dated copy of the completed startup and construction tests and checklists.
5. Only installing individuals who have direct knowledge that a line item task on the construction checklist was actually performed shall initial or check off that item.

G. Deficiencies, Non-Conformance and Approval in Checklists and Startup

1. The contractors shall clearly list any outstanding items of the initial startup and construction procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies are provided to the CxA within two days of test completion.
2. The CxA reviews the report and submits either a non-compliance report or an approval form to the contractors. The CxA shall work with the Prime contractors to correct and retest deficiencies or uncompleted items. The CA will involve the contractors and others as necessary. The installing contractors shall correct all areas that are deficient or incomplete in the checklists and tests in a timely manner and shall notify the CxA as soon as outstanding items have been corrected and resubmit an updated startup report and a Statement of Correction on the original non-compliance report. When satisfactorily completed, the CxA recommends approval of the execution of the checklists and startup of each system to the A/E using a standard form.
3. Items left incomplete, which later cause deficiencies or delays during functional testing, may result in back charges to the responsible party.

3.3 FUNCTIONAL PERFORMANCE TESTING

- A. This subsection applies** to all commissioning functional testing for all divisions.

- B. The general list of equipment** to be commissioned is found in this Section. The specific equipment and modes to be tested for each system are found in the respective sections.
- C. The parties responsible** to execute each test are listed with each test in the respective sections.
- D. Objectives and Scope:** The objective of functional performance testing is to demonstrate that each system is operating according to the Contract Documents. Functional testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems.

 - 1. In general, each system should be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part-and full-load) where there is a specified system response. Verifying each sequence in the sequences of operation is required. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested. Specific modes required in this project are given in Divisions 15 and 16, and other parts of the specification.
- E. Development of Test Procedures:** Before test procedures are written, the CxA shall obtain all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. Using the testing parameters and requirements in Divisions 15, and elsewhere, the CxA shall develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Each contractor or vendor responsible to execute a test shall provide limited assistance to the CxA in developing the procedures review (answering questions about equipment, operation, sequences, etc.). Prior to execution, the CxA shall provide a copy of the test procedures to the contractors, who shall review the tests for feasibility, safety, equipment, and warranty protection.

 - 1. The CxA shall review Owner-contracted factory testing or required Owner acceptance tests which the CxA is not responsible to oversee, including documentation format, and shall determine what further testing or format changes may be required to comply with the Specifications. Redundancy of testing shall be minimized.
 - 2. The purpose of any given specific test is to verify and document compliance with the stated criteria of acceptance given on the test form.
 - 3. The test procedure forms developed by the CxA shall include (but not be limited to) the following information:

 - a. System and equipment or component name(s)
 - b. Equipment location and ID number
 - c. Unique test ID number, and reference to unique construction checklist and start-up documentation ID numbers for the piece of equipment

- d. Date
- e. Project name
- f. Participating parties
- g. A copy of the specification section describing the test requirements
- h. A copy of the specific sequence of operations or other specified parameters being verified
- i. Formulas used in any calculations
- j. Required pre-test field measurements
- k. Instructions for setting up the test
- l. Special cautions, alarm limits, etc.
- m. Specific step-by-step procedures to execute the test, in a clear, sequential, and repeatable format
- n. Acceptance criteria of proper performance with a Yes / No checkbox to allow for clearly marking whether or not proper performance of each part of the test was achieved
- o. A section for comments
- p. Signatures and date block for the CxA

F. Test Methods

1. Functional performance testing and verification may be achieved by manual testing (persons manipulate the equipment and observe performance) or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by stand-alone data loggers. Division 15 Sections and other Sections specify which methods shall be used for each test. The CxA may substitute specified methods or require an additional method to be executed other than what was specified. The CxA will determine which method is most appropriate for tests that do not have a method specified.
2. Altering Setpoints: Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable. For example, to see the AC compressor lockout work at an outside air temperature below 55°F, when the outside air temperature is above 55°F, temporarily change the lockout setpoint to be 2°F above the current outside air temperature.
3. Indirect Indicators: Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent actual conditions and responses. Much of this verification is completed during construction testing.
4. Setup: Each function and test shall be performed under conditions that simulate actual conditions as close as is practically possible. The contractor executing the test shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures,

temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the contractor shall return all affected building equipment and systems, due to these temporary modifications, to their pre-test condition.

- G. Coordination and Scheduling:** The contractors shall provide sufficient notice to the CxA regarding their completion schedule for the construction checklists and startup of all equipment and systems. The CxA will schedule functional tests through the A/E, GC and other contractors. The CxA shall direct, witness and document the functional testing of all equipment and systems. The contractors shall execute the tests.
1. In general, functional testing is conducted after construction testing and startup has been satisfactorily completed. The control system is sufficiently tested and approved by the CxA before it is used for TAB or to verify performance of other components or systems. The air balancing and water balancing is completed and debugged before functional testing of air-related or water-related equipment or systems. Testing proceeds from components to subsystems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems is checked.
- H. Problem Solving:** The CxA will recommend solutions to problems found; however, the burden of responsibility to solve, correct, and retest problems is with the GC, contractors, and A/E.

3.4 DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTS

- A. Documentation:** The CxA shall witness and document the results of all functional performance tests using the specific procedural forms developed for that purpose. Prior to testing, these forms are provided to the contractors for review. The CxA will include the filled-out forms in the O&M manuals.
- B. Non-Conformance**
1. The CxA will record the results of the functional test on the procedure or test form. All deficiencies or non-conformance issues shall be noted and reported to the A/E on a standard non-compliance form.
 2. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CxA. In such cases the deficiency and resolution will be documented on the procedure form.
 3. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the CxA will not be pressured into overlooking deficient work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so at the request of the Owner.
 4. As tests progress and a deficiency is identified, the CxA discusses the issue with the executing contractor.
 - a. When there is no dispute on the deficiency and the contractor accepts responsibility to correct it:

- 1) The CxA documents the deficiency and the Prime contractor's response and intentions, and they go on to another test or sequence. After the day's work, the CxA submits the non-compliance reports to the A/E for signature, if required. A copy is provided to the contractor and CxA. The contractor corrects the deficiency, signs the statement of correction at the bottom of the non-compliance form certifying that the equipment is ready to be retested, and sends it back to the CxA.
 - 2) The contractor reschedules the test and coordinates with CxA to establish a time and date that the test is to be repeated.
 - b. If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:
 - 1) The deficiency shall be documented on the non-compliance form with the contractor's response and a copy given to the A/E and to the contractor representative assumed to be responsible.
 - 2) Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the A/E. Final acceptance authority is with the A/E.
 - 3) Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency, signs the statement of correction on the non-compliance form and provides it to the CxA. The contractor reschedules the test and notifies the CxA of the date and time the test is to be repeated. This will occur until satisfactory performance is achieved.
5. Cost of Retesting
 - a. The cost for the contractor to retest a construction or functional test, if they are responsible for the deficiency, shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated with the responsible parties.
 - b. For a deficiency identified, not related to any construction checklist or startup fault, the following shall apply: The CxA will direct the retesting of the equipment once at no "charge" to the contractor for their time. However, the CxA's time for a second retest will be charged to the contractor, who may choose to recover costs from the responsible Sub.
 - c. The time for the CxA to direct any retesting required because a specific construction checklist or start-up test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be back charged to the contractor, who may choose to recover costs from the party responsible for executing the faulty construction test.
6. The contractor shall respond in writing to the CxA at least as often as commissioning meetings are being scheduled concerning the status of each apparent outstanding discrepancy identified during commissioning. Discussion shall cover explanations of any disagreements and proposals for their resolution.

7. The CxA retains the original non-conformance forms until the end of the project.
8. Any required retesting by any contractor shall not be considered a justified reason for a claim of delay or for a time extension by the contractor.

C. Failure Due to Manufacturer Defect: If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform to the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the Owner. In such case, the contractor shall provide the Owner with the following:

1. Within one week of notification from the A/E, the contractor shall examine all other identical units making a record of the findings. The findings shall be provided to the A/E within two weeks of the original notice.
2. Within two weeks of the original notification, the contractor shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions, which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.
3. The A/E will determine whether a replacement of all identical units or a repair is acceptable.
4. Two examples of the proposed solution will be installed by the contractor and the CxA will be allowed to test the installations for up to one week, upon which the CxA will decide whether to accept the solution.
5. Upon acceptance, the contractor and/or manufacturer shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.

D. Approval: The CxA notes each satisfactorily demonstrated function on the test form. Formal approval of the functional test is made later after review by the CA. The CA recommends acceptance of each test to the Owner and A/E using a standard form. The A/E gives final approval on each test using the same form, providing a signed copy to the CA and the contractor.

3.5 OPERATION AND MAINTENANCE MANUALS

A. Standard O&M Manuals to develop a Systems Manual

1. Systems Manuals are required as part of LEED EA c3 Enhanced Commissioning and CALGreen.
2. Special requirements for the TAB contractor are found in Section 15800. The CxA will need assistance from the ICs and GC in compiling the Systems Manual.

3.6 TRAINING OF OWNER PERSONNEL

- A. The GC shall be** responsible for training coordination and scheduling and ultimately for ensuring that training is completed.
- B. The CxA shall be responsible** for verifying and approving the content and adequacy of the training of Owner personnel for commissioned equipment.
1. In addition to these general requirements, the specific training requirements of Owner personnel by contractor and vendors is specified in Divisions 15 and 16.
 2. Each contractor and vendor responsible for training will submit a written training plan to the CA for review and approval prior to training. The plan will cover the following elements:
 3. For the primary HVAC equipment, the TCC shall provide a short discussion of the control of the equipment during the mechanical or electrical training conducted by others.
 4. The mechanical design engineer shall at the first training session present the overall system design concept and the design concept of each equipment section. This presentation shall include a review of all systems using the simplified system schematics (one-line drawings) including chilled water systems, heat rejection systems, heating systems, fuel oil and gas supply systems, supply air systems, exhaust system, and outside air strategies.
 5. Lighting controls training shall be developed and implemented by the lighting manufacturer representative. This training should occur during tuning and commissioning of the lighting system.

3.7 WRITTEN WORK PRODUCTS

- A. The commissioning process generates** a number of written work products described in various parts of the Specifications. The Commissioning Plan lists all the formal written work products, describes briefly their contents, who is responsible to create them, their due dates, who receives and approves them, and the location of the specification to create them. In summary, the written products are:

Product	Developed By
Commissioning plan	CxA
Commissioning meeting minutes	CxA
Commissioning schedules	GC and CxA with other contractors
Equipment documentation submittals	Contractors
Sequence clarifications	Contractors and A/E as needed
Startup and initial checkout forms filled out	Contractors & Manufacturer's Reps.
Final TAB report	TAB
Issues log (deficiencies)	CxA with responses provided by

Product	Developed By
	contractors
Functional test forms	CxA and Installing Contractors
Filled-out functional tests	CxA and Installing Contractors
Filled-out Lighting Control Tuning and testing	Lighting manufacturer or representative
O&M manuals	Contractors with review by CxA
Systems Manual	CxA
Overall training plan	GC and Installing Contractors
Specific training agendas	Installing Contractors
Final commissioning report	CxA

END OF SECTION

SECTION 2100

SITE FURNISHINGS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Trash Receptacles
- B. Benches
- C. Bicycle Racks

1.2 RELATED WORK

- A. None

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Provide products manufactured by:
 - 1. QCP Corp. (866) 703-3434
 - a) C2 Bench (Q2-C272B)
 - 2. Anova Site Furnishings (800) 325-3047
 - a) Tandem Bike Rack (#CIRCLEBR)

2.2 MATERIALS

- A. Wood: IPE
- B. Galvanized Steel: ASTM A53 or A120 pipe; ASTM A123 or A153 zinc coating on fabricated steel parts after fabrication (hot-dip galvanized).
- C. Concrete or Non-Shrink Grout: As recommended by site furnishings manufacturer or vendor.

2.3 RECYCLED CONTENT

- A. Recycled Material Content: Minimum 90%.

2.4 STEEL AND GALVANIZED-STEEL FINISHES

- A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

2.4 IRON FINISHES

- A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

2.5 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1. Run directional finishes with long dimension of each piece.
 - 2. Directional Satin Finish: No. 4.
 - 3. Dull Satin Finish: No. 6.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

- B. Dimensions upon which Work of this Section may be contingent are to be verified at the project site to ensure proper placement and fit of equipment in the allotted areas.
- C. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.
- D. Set site furnishings plumb, level, and true to line with a neat and finished appearance. Include setting each item in its correct place, fastening it, connecting it, or incorporating it into other portions of the Work, as each item may require; testing and operating equipment to assure proper function.
- E. Include the providing of anchors and adhesives required for installing and attaching the items specified, in accordance with manufacturer's printed specifications.
- F. Keep the premises free from accumulation of waste materials and rubbish caused by this Work. Remove waste materials as specified in other Sections of these specifications.

END OF SECTION 129300

SECTION 06192

METAL-WEB WOOD JOISTS

PART 1 - GENERAL

- 1.01 DESCRIPTION: This Section covers Contractor's survey work and engineering responsibilities where required under this Project.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Open web, wood chord, metal joists.
- B. Related bridging, bracing and anchors.

1.2 RELATED SECTIONS

- A. Section 05120 - Structural Steel: Fabricated steel supports.
- B. Section 05505 - Miscellaneous Metal Fabrications: Fabricated steel connectors.
- C. Section 06112 - Wood Framing and Sheathing: Surrounding and supporting wood frame structure.
- D. Section 06174 - Wood I-Joists: Factory fabricated I-shaped wood framing members with plywood webs.

1.3 SYSTEM DESCRIPTION

- A. Design Criteria:
 - 1. Design Live Load: As indicated on the Drawings.
 - 2. Wood chord metal joists shall be sized and detailed to fit the dimensions and loads indicated on Drawings.
 - 3. Designs shall be in accordance with allowable values and section properties assigned and approved by the building code.

1.4 SUBMITTALS

- A. Shop Drawings: Indicate all critical dimensions for determining fit and placement in the building as well as loads the members are designed to support. Indicate framing system, sizes and spacing of joists, loads and joist cambers, bearing and anchoring details, bridging and bracing and framed openings. Review of shop drawings shall be completed prior to fabrication.
- B. Calculations: Submit structural calculations certified by Registered Civil or Structural Engineer licensed in State of California.

- C. Installation Instructions: Submit manufacturer's installation instructions and recommendations for Project conditions.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Conform to California Building Code (CBC), Chapters 16 and 23 for loads, seismic zoning, classification of building, and other loading criteria and fire-resistance requirements of floor-ceiling assembly and roof-ceiling assembly, as applicable.
2. In addition to conforming with all applicable Codes and regulations, manufacture wood chord metal joists in a plant acceptable to Authority Having Jurisdiction (AHJ), with inspection by an independent inspection and testing agency.

- B. Fabricator's Qualifications: Company specializing in fabrication of wood chord metal trusses with minimum of 5 years verifiable experience. Design joists under direct supervision of Registered Civil or Structural Engineer experienced in wood chord metal joist design and licensed in State of California.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Packaging: Piece-mark and wrap wood chord metal joists in packages before arrival at jobsite.
- B. Protection: Members shall be protected from weather and damage during transportation, erection, and construction.
- C. Storage: Store material at site off the ground in a vertical position.

1.7 SEQUENCING AND SCHEDULING

- A. Coordination: Coordinate and fit metal chord wood joists with carpentry Work and other related Work. Scribe and cope as required for accurate fit. Locate joists and related furring, nailers, blocking, grounds and similar supports to allow proper attachment of other Work.

PART 2 - PRODUCTS

2.1 WOOD CHORD METAL JOISTS

- A. Specified Manufacturer: Red Built, LLC; Chino, CA (909) 465-1208
- B. Acceptable Manufacturers: None identified. Equivalent products of other manufacturers will be acceptable in accordance with the "or equal" provision specified in Section 01600 - Product Requirements, provided products meet or exceed the section modulus of elasticity and moment of inertia (EI) of the specified products, and are acceptable to the Authority Having Jurisdiction (AHJ). Depths of wood chord metal joists shall not exceed those the product indicated on the Drawings, unless approved by Architect.

- C. Wood Chord Metal Joists: Sloped top chord, level bottom chord, double top and bottom chords, complying with ICC Evaluation Service, Inc. (ICC ES) Evaluation Report ESR-1774 Red Built series and sizes of joists as indicated on Drawings.
- D. Structural Wood Chord Members: Red Built - MSR Lumber, manufactured in accordance with ICC Evaluation Service, Inc. (ICC ES) Evaluation Report ESR-1774.
 - 1. Moisture content shall be between 6 and 7 percent.
 - 2. Laminated veneer lumber shall have modulus of elasticity (E) of not less than 2.0×10^6 .
- E. Steel Web Members: Accurately die-stamped, electrically-welded, cold-rolled steel tubing, 45,000 psi minimum yield strength, electro-galvanized.
- F. Connecting Pins and Bearing Accessories: Structural carbon steel, size as required for member design, electrogalvanized in compliance with ASTM A 307 or ASTM A 449.
- G. Joist Bridging: Type, size and spacing as recommended by joist manufacturer, or as indicated on the Drawings.
- H. Adhesives: Waterproof types, as standard with joist manufacturer.
- I. Fabrication: Shop fabricate all joists in accordance with Reference Standards and for use in accordance with ICC Evaluation Service, Inc. (ICC ES) Evaluation Report ESR-1774

2.2 ACCESSORIES

- A. Wood Blocking, Support Members and Framing for Openings: In accordance with Section 06112 - Wood Framing and Sheathing and Section 06114 - Wood Backing, Blocking and Curbing.
- B. Framing Anchors and Fasteners: Comply with requirements specified in Section 06112 - Wood Framing and Sheathing, except provide framing anchors and fasteners as required and recommended by joist manufacturer, as applicable. Fasteners shall be galvanized steel.
- C. Bearing Plates: Electrogalvanized steel, as indicated on Drawings or, if not indicated, as recommended by manufacturer.

2.3 WOOD CHORD METAL JOISTS FABRICATION

- A. Wood Chord Metal Joists Fabrication: Shop fabricate joists in accordance with applicable ICC Evaluation Service, Inc. (ICC ES) Evaluation Report, including conditions of acceptance by the Authority Having Jurisdiction (AHJ).
 - 1. Fabricate wood chord metal joists in accordance with notes on Drawings.
 - 2. Provide continuous chords without joints.
 - 3. For spans greater than 20'-0", manufacture wood chord metal joists with camber based on radius of 2250'-0", unless otherwise indicated on the Drawings.

2.4 SOURCE QUALITY CONTROL

A. Source Quality Control:

1. Provide continuous inspection of fabrication by a compliance assurance or inspection agency listed by the National Evaluation Service Committee as part of manufacturer's standard in-plant inspection policies and procedures.
 - a. Inspector shall be subject to approval for that purpose by Authority Having Jurisdiction (AHJ).
2. To be eligible for approval, the fabrication inspector shall be examined as to his knowledge and experience in glued construction.
3. After fabrication and inspection, stamp each joist with an identifying mark, noting name and plant number of manufacturer, grade, applicable ICC Evaluation Service, Inc. (ICC ES) Evaluation Report number, and identification of quality control agency.

B. Structural Wood Chord Members:

1. The fabrication inspector shall make a verified report identifying the members by mark and including pertinent data such as grade and specie of lumber, the type of glue, the extremes of moisture content and such other information as may be required.
2. The fabrication inspector's verified report shall show, of his own personal knowledge, the Work covered by the report has been performed and materials used and installed in every product in accordance with, and in conformity to, the duly approved plans, shop drawings and specifications.
3. The verified report, together with an identified copy of the lumber grade certificate shall be mailed to Authority Having Jurisdiction (AHJ).

C. Steel Web Members: Round tubular steel web members shall be certified as to conformance to ASTM A500, Grade B, by mill certificate.

1. Members shall be identified by heat or melt number.
2. One tension and on bend test shall be made for each heat.
3. The tests shall be made by an independent laboratory on samples selected by the fabrication inspector, who will be in overall charge of fabrication inspection.
4. One copy of test report shall be forwarded to the Authority Having Jurisdiction (AHJ) for each project.

D. Welding: All welding operations shall be inspected by a qualified welding inspector who will furnish a written report to the Authority Having Jurisdiction (AHJ) verifying that the welding has been performed in accordance with the plans and specifications.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordination: Coordinate placement and installation of support items.
- B. Scheduling: Coordinate and sequence wood chord metal joist installation and details with Work specified in other Sections, to ensure proper interface of joists with adjoining components, to minimize cutting and penetration of joists and to limit erected joists to the shortest possible exposure to the elements before closing-in of building envelope.

3.2 INSTALLATION

- A. Installation: Erect and secure joists as indicated on Drawings, the reviewed shop drawings and manufacturer's installation instructions and recommendations.
 - 1. Space, adjust and align joists in proper locations before permanently fastening. Align joists between supports and hold in place with temporary bracing until sheathing is secured in place.
 - 2. Immediately fasten joists to supporting construction after setting in proper location, with joists plumb, square and true to line. Use fasteners as indicated on the Drawings and in accordance with applicable ICC Evaluation Service, Inc. (ICC ES) Evaluation Report, including conditions of acceptance by the Authority Having Jurisdiction (AHJ).
 - 3. Make connections and install all blocking, stiffeners and bridging as erection progresses and before construction loads are imposed on joists.
 - 4. Do not permit temporary construction loads which cause member stresses beyond design limits.
- B. Openings: Frame openings between joists with lumber as specified in Section 06112 - Wood Framing and Sheathing and as indicated on Drawings. Place headers and supports at wall openings as required.
- C. Blocking and Stiffeners: Install blocking and stiffeners as required and shown for lateral support of members, to provide nailing surface for sheathing and finish materials and to fireblock cavities in accordance with California Building Code (CBC), Chapter 23.
- D. Erection Bracing: Provide erection bracing in addition to specified bridging to keep joists straight and plumb and to assure adequate lateral support until sheathing material has been applied.
- E. Construction Loads: Do not permit temporary construction loads which cause member stresses beyond design limits.
- F. Tolerances: 1/2-inch maximum from true position.
- G. Field Cutting and Modifications: Do not alter joists in field except as permitted for penetrating elements such as piping and conduit.

1. Comply with details shown on the Drawings and according to applicable ICC Evaluation Service, Inc. (ICC ES) Evaluation Report, including conditions of acceptance by the Authority Having Jurisdiction (AHJ).
2. Do not repair damaged or defective joists. Joists which are damaged or found to not conform to specified requirements shall be rejected and immediately removed from the Project site. Provide new joists at no change in Contract Time and Contract Sum.

END OF SECTION

SECTION 07265

VAPOR EMISSION REDUCTION SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Fluid-applied, water vapor control coating system** applied to all concrete floors indicated to receive wood flooring, resilient flooring and carpet. System shall include sealer for water vapor control and protective portland cement-based topcoat suitable for protection during construction activities and future floor covering removable, surface preparation and installation of new finish flooring.
1. Concrete substrate preparation shall include shot blasting and other preparatory measures necessary to provide suitable condition for application of water vapor control coating system.
 2. Completed surface condition shall be suitable for installation of finish flooring specified in other Sections.

1.02 RELATED SECTIONS

- A. Section 03300 - Cast in Place Concrete:** Concrete floor slabs; remediation of defective concrete, including concrete floor slabs with excessive moisture vapor emission.
- B. Section 09625 - Resilient Athletic Flooring System:** Flooring installed over concrete substrate.
- C. Section 09645 - Cushioned Wood Flooring Assemblies:** Flooring installed over concrete substrate.
- D. Section 09650 - Resilient Flooring:** Flooring over concrete substrate.
- E. Section 09655 - Linoleum Sheet Flooring:** Flooring over concrete substrate.
- F. Section 09690 - Carpet Tile:** Flooring installed over concrete substrate.

1.03 REFERENCES

- A. ASTM International (ASTM):** Formerly American Society for Testing and Materials.
1. ASTM E 96 - Standard Test Methods For Water Vapor Transmission of Materials
 2. ASTM F 1869 - Standard Test Method For Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
 3. ASTM F 710 - Standard Test Method for Preparing Floors To Receive Resilient Flooring.

1.04 SUBMITTALS

- A. Product Data:** Provide data for concrete floor cleaning, coating and preparation materials.
- B. Laboratory Testing:** Submit current independent laboratory reports, dated within 2 years of project start, for specified performance. Reports dated beyond 2 years are not acceptable.
- C. Installer's Qualifications:** Valid manufacturer's approved applicators certificate for warranted system.
- D. Installation Instructions:** Indicate procedures and processes.
- E. Warranty:** Submit manufacturer's warranty, as specified.
- F. Insurance Certificate:** Submit product manufacturer's warranty certificate listing City as additional insured.

1.05 QUALITY ASSURANCE

- A. Coating Manufacturer's Qualifications:** Manufacturer specializing in single- and two-component products meeting specified ASTM third party laboratory testing.
- B. Installer's Qualifications:** Manufacturer-approved, licensed and certified for the application of specified products.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Project Conditions:** Maintain temperatures of ambient temperature between 55 and 85 degrees F, 72 hours prior to, during and after application.

1.07 WARRANTY

- A. Extended Warranty:** Manufacturer shall furnish extended warranty to City agreeing to correct defective Work for period of 15 years from dated established by Notice of Completion.
 - 1. Manufacturer's warranty shall cover water vapor emission coating failure, including but not limited to, suppression of water vapor emission, alkalinity and migrating salts through concrete surfaces. Emission levels after application shall not exceed flooring manufacturer's requirements.
 - 2. Manufacturer shall provide product liability insurance in the amount of \$6,000,000 per occurrence and list City as additional insured.
 - 3. Installation shall include a cement topcoat to provide sustainable surface for future flooring updates and replacements to allow warranty coverage to be extended.

- B. Warranty Repair Work:** Include removal and replacement of flooring products, removal of portland cement topcoat, removal of water vapor emission coating, preparation of concrete substrate and application of new water vapor emission control coating system.

1. Remedial work shall include all costs to City for incidental damages, including necessary removal and reinstallation of furniture, fixtures and equipment.
2. Remedial work shall include removal and replacement of all flooring products in room so that consistent appearance and performance of flooring surface is restored.

PART 2 - PRODUCTS

2.01 VAPOR EMISSION COATING SYSTEM

- A. Specified Manufacturer:** Synthetics International, (866/646-0356).
- B. Acceptable Manufacturers:** Equivalent products of other manufacturers, including those listed below, will be acceptable in accordance with the "or equal" provision specified in Section 01600 - Product Requirements.
1. DiamondStone LLC (Diamond-VRS), (888/817-8663).
 2. Ardex Engineered Cements (Ardex MC), (724/203-5001 or 888/512-7339).
- C. Water Vapor Emission Control System:** Synthetic 30 manufactured by Synthetics International, fluid-applied, water vapor control coating system that penetrates and suppresses water vapor emission from portland cement concrete and creates alkali resistance to 14 pH.
1. Water vapor control coating system shall be two-coat application of proprietary two-component, low viscosity, polymer coating which forms highly insoluble film, reducing water vapor by 95 percent (ASTM E 96) and resistant to 14 pH (ASTM D 1308).
 2. Water vapor control coating system shall remain resistant to 100% RH when tested according to ASTM F 2170, In-Situ Relative humidity exposure.
 3. Completed application shall maintain water vapor emission rate of less than 2.0 lbs. when tested according to ASTM F 1869.
- D. Properties:** Water vapor control coating system shall be tested by independent testing laboratory tested in accordance with the following procedures and results:
1. Water Vapor Transmission - WRT:
 - a. ASTM E 96 Grains/ft²/hr: Less than 0.6.
 - b. ASTM E 96 Pounds/1000 ft² 24 hours: Less than 2.0.
 - c. ASTM E 96 grams/h· m²: Less than 0.7.
 2. Water Vapor Permeance - WVP:
 - a. ASTM E 96 Perms (inch-pounds) of less than 2.4.

- b. ASTM E 96 Grams/ $\text{Pa} \cdot \text{s} \cdot \text{m}^2 \times 10^{-?}$ of less than 13.6
- c. ASTM E 96 Nanograms/ $\text{Pa} \cdot \text{s} \cdot \text{m}^2$ of less than 136.3
- 3. Alkali Resistance - 30 days:
 - a. ASTM D 1308 - Resistant to 35% potassium hydroxide exposure.
 - b. ASTM D 1308 - Resistant to 14 pH solution exposure.
- 4. Concrete Adhesion - Pull off:
 - a. ASTM D 4541 Adhesion of 375 to 600 psi (100% concrete cohesive failure).
- 5. Low Emitting - VOC Content:
 - a. EPA Method 24 testing of less than 62 g/liter.
 - b. Meets LEED EQ Credit 4.2
 - c. Meets CHPS EQ Credit 2.2
 - d. Contains no formaldehyde, formaldehyde precursors and zero-carcinogens.
 - e. Contains zero hazardous air pollutants (HAPs).
 - f. Meets indoor air quality requirements for office, schools and healthcare by emission chamber testing.

2.02 ACCESSORY PRODUCTS

- A. Moisture Tolerant Primer:** Two-component, low viscosity liquid for chemically bonding cement products to vapor control coating.
- B. Portland Cement Topcoat:** Portland cement, single-component floor prep product as approved by coating manufacturer. Product shall be applied at nominal 1/8-inch thickness.
- C. Water Vapor Emission Test Kits:** American Moisture Test, Inc. (866/670-9700), suitable for testing according to ASTM F 1869.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examination:**
 - 1. Verify substrates meet manufactures requirements before starting preparation and application.
 - 2. Verify that items which penetrate substrate to receive coating are securely installed.

3.02 PREPARATION

- A. Preparation:**
 - 1. Remove foreign materials detrimental to system, such as curing compounds, sealers, loose patching materials or surface oil) shall be removed by mechanical scarification or shot-blasting.
 - 2. Repair cracks, joints, low spots and bumps as acceptable to Architect and according to criteria of manufacturer of water vapor emission mitigation.
 - 3. Vacuum all surfaces. Water vapor emission mitigation system shall not

- be applied to frozen, dirty, on-absorptive or glossy surfaces. Do not acid etch or use clean sweeping agents.
4. Ensure that prepared surfaces are solid, free of loose particles, cracks, pits, rough projections or foreign matter detrimental to maximum adhesion of the water vapor control coating system.

3.03 APPLICATION

- A. Application of Water Vapor Control Coating System:** Comply with manufacturer's instructions and recommendations.
 1. Apply moisture-tolerant primer to ensure bond of all cement products to vapor control coating.
 2. Apply ultra low-viscosity moisture-alkaline penetrant over entire concrete floor surface, using lint-free nap roller or floor brush, and saturate entire concrete surface. Allow penetrant to cure according to manufacturer's requirements.
 3. Apply penetrant to saturate surfaces, cracks and joints in accordance with manufacturer's spread rates and curing requirements.
- B. Application of Topcoat:** Mix and apply portland cement-based topcoat product to provide smooth floor surface suitable for installation of flooring. Cured thickness shall comply with manufacturer's requirements for surface capable of future flooring removal and replacement.

3.04 FIELD QUALITY CONTROL

- A. Field Testing:** In accordance with requirements specified in Section 01400 - Quality Control.
 1. Testing shall be performed according to ASTM F 1869 after application and curing of water vapor control coating, to verify water vapor emission rate. Testing shall be minimum of 10 tests per 1,000 sf of floor area or portion thereof, using suitable, prepackaged calcium chloride dome test kits.
 2. Should testing result in water vapor emission greater than 2.5 lbs. per 1,000 square feet in 24 hours, clean floor and reapply water vapor control coating according to manufacturer's instructions.
 3. Retest and perform additional remedial measures according to manufacturer's instructions and recommendations until water vapor emission result of 2.5 lbs. is achieved.

END OF SECTION

SECTION 07540

SBS MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Hybrid Styrene-butadiene-styrene (SBS) modified bituminous membrane roofing system on wood deck, including but not limited to:
2. Roof membrane and membrane base flashings.
3. Roof surfacing consisting of mineral granulated cap sheet.
4. Title 24 compliant coating.

A. Related Work: The work includes but is not limited to the installation of:

1. Substrate Preparation
2. Roof Drains
3. DensDeck
4. Roof Membrane
5. Fasteners
6. Adhesive for Flashings
7. Roof Membrane Flashings
8. Walkways
9. Metal Flashings, with either field painted or shop applied finishes
10. Sealants

1.03 DEFINITIONS

A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

B. Hot Roofing Asphalt: Roofing asphalt heated to its equiviscous temperature, the temperature at which its viscosity is 125 centipoise for mop-applied roofing asphalt and 75 centipoise for mechanical spreader-applied roofing asphalt, within a range of plus or minus 25 deg. F (14 deg. C), measured at the mop cart or mechanical spreader immediately before application.

C. Cold Process Roofing - An asbestos free formulation of asphalt, solvent, thixotrope, mineral stabilizer and reinforcing fibers used as an interplay or cap sheet adhesive.

1.04 ACTION SUBMITTALS

- A. Product Data:** For each type of product indicated.
- B. Shop Drawings:** For roofing system. Include plans, elevations, sections, details, and attachments to other work. Provide roof plan showing orientation and types of roof deck, orientation of membrane roofing, and fastening spacings and patterns for mechanically fastened components.
 - 1. Base flashings and built-up terminations.
 - 2. Indicate details meet requirements of NRCA required by this Section.
 - 3. Crickets, saddles, and tapered edge strips, including slopes.

1.05 INFORMATIONAL SUBMITTALS

- A. Contractor's Product Certificate:** Submit certificate, indicating products intended for Work of this Section, including product names and numbers and manufacturers' names, with statement indicating that products to be provided meet the requirements of the Contract Documents.
- B. Qualification Data:** For Installer, Manufacturer, and Roofing Inspector. Include letter from Manufacturer written for this Project indicating approval of Installer.
- C. Manufacturer Certificates:** Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article. Submit evidence of compliance with performance requirements, including UL listing certificate. Indicate that proposed system components are compatible.
- D. Product Test Reports:** Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of built-up roofing.
- E. Warranties:** Unexecuted sample copies of special warranties.
- F. Field Quality Control Reports:** Daily reports of Roofing Inspector. Include weather conditions, description of work performed, tests performed, defective work observed, and corrective actions taken to correct defective work.

1.06 CLOSEOUT SUBMITTALS

- A. Maintenance Data:** To include in maintenance manuals.
- B. Warranties:** Executed copies of warranties.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications:** An employer of workers trained and certified by manufacturer, including a full-time on-site supervisor with a minimum of five years' experience installing products comparable to those specified, able to

communicate verbally with Contractor, Architect, and employees, and qualified by the manufacturer to install manufacturer's product and furnish warranty of type specified.

B. Manufacturer Qualifications: Approved manufacturer with UL listed roofing systems comparable to those specified for this Project, with minimum five years' experience in manufacture of comparable products in successful use in similar applications, and able to furnish warranty with provisions matching specified requirements.

1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
 - a. Product data, including certified independent test data indicating compliance with requirements.
 - b. Samples of each component.
 - c. Sample submittal from similar project.
 - d. Project references: Minimum of five installations of specified products not less than five years old, with Owner and Architect contact information.
 - e. Sample warranty.

C. Roofing Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Roofing Inspector shall be one of the following:

1. An authorized full-time technical employee of the manufacturer.
2. Contractor shall acquire five (5) inspection service days utilizing the manufacturer's inspector.

D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products.

E. Pre-installation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, testing and inspecting agency representative, roofing installer, roofing system manufacturer's representative, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review drawings and specifications.
3. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
4. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

5. Examine substrate conditions and finishes for compliance with requirements, including flatness and fastening.
6. Review structural loading limitations of roof deck during and after roofing.
7. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
8. Review governing regulations and requirements for insurance and certificates if applicable.
9. Review temporary protection requirements for roofing system during and after installation.
10. Review roof observation and repair procedures after roofing installation.

1.08 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.

1.09 PROJECT 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.
- B. **Daily Protection:** Coordinate installation of roofing so insulation and other components of roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
 1. Provide tie-offs at end of each day's work to cover exposed roofing and insulation with a course of roofing sheet securely in place with joints and edges sealed.
 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing.
 3. Remove temporary plugs from roof drains at end of each day.

4. Remove and discard temporary seals before beginning work on adjoining roofing.

1.10 WARRANTY

- A. Warranty, General:** Warranties specified shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents. Warranty shall be issued by same manufacturer issuing the metal roof system warranty.
- B. Manufacturer's Warranty:** Manufacturer's standard or customized form, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
 1. Manufacturer's warranty includes roofing membrane, base flashings, fasteners, roofing membrane accessories and other components of roofing system specified in this Section.
 2. Warranty Period: 20 years from date of Substantial Completion.
- C. Installer's 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 roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, and walkway products, for the following warranty period:
 1. Warranty Period: 2 years from date of Substantial Completion.
- D. Extended Roof System Warranty:** Warranties specified in this Section include the following components and systems specified in other sections supplied by the roofing system Manufacturer, and installed by the roofing system Installer:
 1. Sheet metal flashing and trim, including roof penetration flashings.
 2. Manufactured copings, roof edge, counterflashings, and reglets.
 3. Roof curb, hatch, and penetration flashings.
 4. Roof and parapet expansion joint assemblies.
 5. Metal roof, wall, and soffit panels and trim.
- E. Manufacturer Inspection and Preventive Maintenance Requirement:** By manufacturer's technical representative, to report maintenance responsibilities to Owner necessary for preservation of Owner's warranty rights. The cost of manufacturer's inspections and preventive maintenance is included in the Contract Sum.
 1. Inspections to occur in the following years subsequent to completion: 2, 5, 10 and 15.

PART 2 - PRODUCTS

2.01 MANUFACTURERS: **Basis of Design Manufacturers/Products:** Subject to compliance with requirements, provide products by one of the following manufacturers comparable to the Basis of Design product specified:

A. **Tremco, Inc.**, (714) 335-4739, rtolsma@tremcoinc.com

2.02 PERFORMANCE REQUIREMENTS

- A. **General Performance:** Roofing shall withstand exposure to weather without failure or leaks due to defective manufacture or installation.
- B. **Material Compatibility:** Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
- C. **Exterior Fire-Test Exposure:** ASTM E 108, Class A; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.
- D. **Fire-Resistance Ratings:** Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- E. **Solar Reflectance Index:** Not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.
- F. **Energy Star Listing:** Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.
- G. **Energy Performance:** Roofing system shall have an initial solar reflectance index of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.

2.03 ROOFING MEMBRANE MATERIALS

- A. **Sheathing Paper:** Red rosin type, minimum 3 lb/100 sq. ft. (0.16 kg/sq. m).
- B. **Base Sheet:**
 - 1. ASTM D 4601 Type II non-perforated SBS-modified asphalt coated fiberglass/fiberglass/ polyester reinforced high tensile strength sheet dusted with fine mineral surfacing on both sides..
 - a. Basis of design product: Tremco, BURmastic Composite Ply HT.
 - b. Tensile Strength, minimum, ASTM D 5147: Machine direction, 165 lbf/in (28.9 kN/m); Cross machine direction, 150 lbf/in (26.3 kN/m).
 - c. Tear Strength, minimum, ASTM D 5147: Machine direction, 210 lbf (0.9 kN); Cross machine direction, 185 lbf (0.8 kN).

- d. Elongation at 77 deg. F (25 deg. C), minimum, ASTM D 5147: 6 percent.
- e. Thickness, minimum, ASTM D 146: 0.055 inch (1.4 mm).

C. Hybrid System Asphalt Ply Sheets:

- 1. ASTM D 2178 Type IV asphalt-impregnated glass-fiber ply sheet.
 - a. Basis of design product: Tremco, THERMglass Type IV.
 - b. Net Dry Mass, ASTM D 146: 7.5 lb/100 sq ft.
 - c. Breaking Strength, ASTM D 146: 44 lbf/in.

D. SBS Modified Bituminous Cap Sheet:

- 1. ASTM D 6163 Type I Grade G SBS-modified asphalt-coated glass-fiber-reinforced sheet, granular surfaced.
 - a. Basis of design product: Tremco, POWER ply Standard FR.
 - b. Exterior Fire-Test Exposure, ASTM E 108: Class A.
 - c. Tensile Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: Machine direction 80.0 lbf/in (14.0 kN/m); Cross machine direction 70.0 lbf/in (12.0 kN/m).
 - d. Tear Strength at 73 deg. F (23 deg. C), minimum, ASTM D 5147: Machine direction, 100 lbf (440 N); Cross machine direction 100 lbf (440 N).
 - e. Elongation at 73 deg. F (23 deg. C), minimum, ASTM D 5147: Machine direction 7.5 percent; Cross machine direction 7.5 percent.
 - f. Low Temperature Flex, maximum, ASTM D 5147: -15 deg. F (-26 deg. C).
 - g. Thickness, minimum, ASTM D 5147: 0.120 inch (3 mm).

E. Base Flashing Sheet:

- 1. Thermoplastic PVC/TPA sheet, ASTM D4434 Type IV internally fabric reinforced, Energy Star qualified, CRRC listed, and California Title 24 Energy Code compliant.
 - a. Basis of design product: Tremco, TPA Roof Membrane.
 - b. Tensile Strength at 0 deg. F (-18 deg. C), minimum, ASTM D 6509: 300 lbf/in (52 kN/m).
 - c. Tear Strength at 77 deg. F (25 deg. C), minimum, ASTM D 6509: 100 lbf (440 N).
 - d. Elongation at 0 deg. F (-18 deg. C), minimum at fabric break, ASTM D 6509: 25 percent.
 - e. Minimum Thickness, nominal, ASTM D 751: 45 mils (1.1 mm).
 - f. Exposed Face Color: White.
 - g. Reflectance, ASTM C 1549: 86 percent.
 - h. Thermal Emittance, ASTM C 1371: 0.86.
 - i. Solar Reflectance Index (SRI), ASTM E 1980: 108.
 - j. Recycled Content, minimum: 25 percent preconsumer.

F. Stripping/Target Ply Sheet: Non-woven, heat resistant, polyester sheet, with the following properties:

1. Polytherm Stripping Ply.
2. Breaking Load at 77 deg. F (25 deg. C), minimum, ASTM D 4830: machine direction, 150 lbf (667 N); cross-machine direction, 130 lbf (40.3 kN/m).
3. Trapezoid Tearing Strength, minimum, ASTM D 4830: machine direction, 60 lbf (267 N); cross-machine direction, 60 lbf (1.7 kN).
4. Elongation at 77 deg. F (25 deg. C), minimum, ASTM D 4830: machine direction, 30 percent; cross-machine direction, 30 percent.
5. Thickness, minimum, ASTM D 1777: 0.035 inch (1.2 mm).
6. Weight, minimum, ASTM D 3776: 5.5 oz./sq. ft (1.4 kg/sq. m.).

G. Glass-Fiber Fabric: Woven glass-fiber cloth treated with asphalt, ASTM D 1668 Type I.

2.04 ASPHALT MATERIALS

A. Asphalt primer, water-based, polymer modified.

1. Basis of design product: Tremco, TREMprime WB.
2. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 2 g/L.

B. ASTM D 312 Type IV hot-melt asphalt.

1. Basis of design product: Tremco, Premium IV.
2. Softening Point, min/max, ASTM D 36: 215/225 deg. F (102/107 deg. C).
3. Ductility at 77 deg. F, minimum, ASTM D 113: 2.5 cm.
4. Penetration at 77 deg. F (25 deg. C), min/max, ASTM D 5: 1530 dmm.

C. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application.

2.05 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing membrane.

1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Cold-Applied Cap Sheet Adhesive:

1. Cold-applied roofing adhesive and surfacer, one-part, formulated for compatibility and use with specified roofing membranes and flashings.
 - a. Basis of design product: Tremco, POWERply Standard Cold Adhesive LV .
 - b. Volatile Organic Compounds (VOC), maximum, ASTM D 6511: 197 g/L.
 - c. Nonvolatile Content, minimum, ASTM D 6511: 72 percent.
 - d. Flash Point, minimum, ASTM D 93: 100 deg F (38 deg C).

- C. Joint Sealant:** Elastomeric joint sealant compatible with roofing materials, with movement capability appropriate for application.
1. Joint Sealant, Polyurethane: ASTM C 920, Type S, Grade NS, Class 25 single-component moisture curing sealant, formulated for compatibility and use in dynamic and static joints..
 - a. Basis of design product: Tremco, TremSEAL PRO.
 - b. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 85 g/L.
 - c. Hardness, Shore A, ASTM C 661: 40.
 - d. Color: White.
- D. Fasteners:** Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FM Global 4470, designed for fastening roofing components to substrate, tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.
- E. Metal Flashing Sheet:** Metal flashing sheet is specified in Division 07 Section "Sheet Metal."
- F. Miscellaneous Accessories:** Provide miscellaneous accessories recommended by roofing system manufacturer.

2.06 ROOF INSULATION

- A. Roof Insulation, General:** Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Global-approved roof insulation.
1. Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48) unless otherwise indicated.
 2. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes for sloping to drain and at transitions. Fabricate to slopes indicated.
 - a. 1/4:12 inch slope min.
 - b. Polyisocyanurate cricket material, ASTM C 1289, Type II, Class 1, Grade 2.
 - c. Cricket system cover board: 1/2 inch wood fiber board, asphalt coated on all six sides, ASTM C208.
- B. Insulation Adhesive:**
1. Premium IV Asphalt
- C. Insulation Cant Strips:** ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.
- D. Wood Cant Strips:** Comply with requirements in Division 06 carpentry section

- E. Tapered Edge Strips:** ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

2.07 SURFACING MATERIALS

A. White Roof Coating Primer:

1. Tremco SP Primer

B. Acrylic Roof Coating, Highly-Reflective Elastomeric: ASTM D 6083, applied as base coat plus finish coat over prepared and primed roof surfaces.

1. Basis of design product: Tremco, Solargard 6083 Base and Top Coat.
2. Solar Reflectance Index (SRI), white, ASTM E 1980: 105 initial; 100 aged.
3. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: Less than 50 g/L.
4. Tensile Strength at 73 deg. F (23 deg. C), minimum, ASTM D 2370: Not less than 250 psi (1700 kPa).
5. Elongation at 73 deg. F (23 deg. C), minimum, ASTM D 2370: Not less than 350 percent.
6. Flexibility at -15 deg F (-26 deg C), ASTM D 522: Pass 1/2 inch mandrel after 1000 hrs. accelerated weathering.
7. Solids by weight, ASTM D 1644: Not less than 60 percent.
8. Solids by volume, ASTM D 2697: Not less than 50 percent.
9. Color, Base Coat: Off-White.
10. Color, Top Coat: White.
11. Solar Reflectance Index (SRI), Top Coat, ASTM E 1980: 105 initial; 100 aged.

2.08 WALKWAYS

A. Walkway pads, ceramic-granule-surfaced reinforced asphaltic composition slip-resisting pads, manufactured as a traffic pad for foot traffic, 1/2 inch (13 mm) thick minimum.

1. Basis of design product: Tremco, Trem-Tred.
2. Flexural Strength at max. load, minimum, ASTM C 203: 210 psi (1.5 kPa).
3. Granule adhesion (weight loss), maximum, ASTM D 4977: 1.1 gram.
4. Impact Resistance at 77 deg. F (25 deg. C), ASTM D 3746: No Damage to Roof.
5. Pad Size: 36 by 48 inch (914 by 1220 mm).

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance** with the following requirements and other conditions affecting performance of roofing system:

1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
2. Verify that, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation. wood cants
3. Wood Roof Deck: Verify that wood deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch (1.6 mm) out of plane relative to adjoining deck.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean substrate of dust**, debris, moisture, and other substances detrimental to roofing 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.

3.03 INSTALLATION, GENERAL

- A. Install roofing system** in accordance with manufacturer's recommendations.
- B. Install wood cants**, blocking, curbs, and nailers in accordance with requirements of Division 06 carpentry section.
- C. Install roofing membrane**, base flashings, wood cants, blocking, curbs, and nailers, and component materials in compliance with requirements in FM Global 4470 as part of a membrane roofing system as listed in FM Global's "Approval Guide" for fire/windstorm classification indicated. Comply with recommendations in FM Global Loss Prevention Data Sheet 1-49, including requirements for wood nailers and cants.
- D. Install roofing system in** accordance with the following NRCA Manual Plates and NRCA recommendations; modify as required to comply with requirements of FM Global references above. Provide all required trim. Flashing and accessories required for proper installation:
1. Metal Parapet Cap (Coping) and Base Flashing: Plates MB-1 and MB-1S.
 2. Surface-Mounted Counterflashing for Concrete Walls (at Parapet Wall): Plates MB-4 and MB-4S.
 3. Base Flashing for Wall-supported Deck: Plates MB-5 and MB-5S.
 4. Base and Surface-mounted Counterflashing: Plates MB-4 and MB-4S.
 5. Scupper Through Raised Perimeter Edge: Plates MB-21 and MB-21S.
 6. Equipment Support Curb: Plates MB-9 and MB-9S.
 7. Equipment Support Stand: Plates MB-10.
 8. Equipment Support Stand and Typical Rain Collar Penetration Detail: Plates MB-11 and MB-11S.

9. Raised Curb Detail at Rooftop HVAC Units, Premanufactured: Plates MB-12 and MB-12S and Division 7 Section "Roof Accessories."
10. Skylight, Scuttle (Roof Hatch), and Smoke Vents: Plates BUR-14 and BUR-14S and Division 07 Section "Roof Accessories."
11. Raised Curb Detail at Rooftop HVAC Units (Job site constructed wood curb): Plates MB-13 and MB-13S and Division 06 Section "Miscellaneous Rough Carpentry."
12. Penetration, Sheet Metal Enclosure for Piping Through Roof Deck: Plates MB-16 and MB-16S
13. Penetration, Isolated Stack Flashing: Plates MB-17 and MB-17S.
14. Penetration, Isolated Stack Flashing: Plates MB-17A and MB-17AS.
15. Penetration, Plumbing Vent: Plates MB-18 and MB-18S.
16. Roof Drain: Plates MB-20 and MB-20S.
17. Roof Drain: Plates MB-20A and MB-20AS.
18. Guide for Clearances between Pipes / Walls / Curbs - Table 4
19. Guide for Crickets and Saddles - Table 5
20. Guide for Edge Scuppers with Tapered Saddles - Table 6

3.04 INSULATION INSTALLATION

- A. Comply with built-up roofing** manufacturer's written instructions for installing roof insulation.
- B. Cant Strips:** Install and secure preformed 45-degree cant strips at junctures of built-up roofing with vertical surfaces or angle changes greater than 45 degrees.
- C. Install tapered insulation** under area of roofing to conform to slopes indicated.
- D. Install insulation with long** joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
 1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
- E. Trim surface of insulation** where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- F. Install tapered edge** strips at perimeter edges of roof that do not terminate at vertical surfaces.
- G. Mechanically Fastened and Adhered Insulation:** Install first layer of tapered insulation, crickets and saddles to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 1. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
 2. Set each subsequent layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg. F (14 deg. C) of equiviscuous temperature.

- H. Cover Board Installation:** Install cover board over tapered insulation, crickets and saddles with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches (150 mm) in each direction. Loosely butt cover boards together.

1. Apply hot roofing asphalt to insulation and immediately bond cover board to installation.

3.05 HOT-APPLIED ROOFING MEMBRANE INSTALLATION, GENERAL

- A. Install roofing membrane system** according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing" and as follows:

1. Deck Type: Wood deck.
 - a. Base Sheet: One, installed over sheathing paper.
 - 1) Attachment Method: Mechanically fastened
 - b. Number of Glass-Fiber Ply Sheets: Two. Install additional ply in valleys and waterways.
 - 1) Adhering Method: Mopped.
 - c. Granular-Surfaced SBS-Modified Asphalt Cap Sheet:
 - 1) Adhering Method: Cold-applied adhesive.

- B. Start installation of** roofing membrane in presence of roofing system manufacturer's technical personnel.

- C. Cooperate with testing** agencies engaged or required to perform services for installing roofing system.

- D. Coordinate installation of roofing** system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

1. Provide tie-offs at end of each day's work configured as recommended by NRCA Roofing Manual Appendix: Quality Control Guidelines - Insulation to protect new and existing roofing.
2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing.
3. Remove temporary plugs from roof drains at end of each day.
4. Remove and discard temporary seals before beginning work on adjoining roofing.

- E. Hot Roofing Asphalt Heating:** Heat asphalt to its equiviscous temperature, measured at the mop cart or mechanical spreader immediately before application. Circulate asphalt during heating. Do not raise asphalt temperature above equiviscous temperature range more than one hour before time of application. Do not exceed asphalt manufacturer's recommended temperature limits during asphalt heating. Do not heat asphalt within 25 deg. F (14 deg. C) of

flash point. Discard asphalt maintained at a temperature exceeding finished blowing temperature for more than four hours.

1. Apply hot roofing asphalt within plus or minus 25 deg. F (14 deg. C) of equiviscous temperature and adhere components to asphalt heated to not less than 425 deg. F (236 deg. C).

F. Hot Roofing Asphalt Heating, SEBS-Modified Asphalt: Heat and apply SEBS-modified elastomeric roofing asphalt according to roofing system manufacturer's written instructions.

G. Substrate-Joint Penetrations: Prevent roofing asphalt and adhesives from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

3.06 BASE-SHEET INSTALLATION

A. Loosely lay one course of, lapping edges and ends a minimum of 2 inches and 6 inches (50 mm and 150 mm), respectively.

B. Install lapped base-sheet course, extending sheet over and terminating beyond cants. Attach base sheet as follows:

1. Mechanically fasten over rosin sheet to wood decks. Fasten according to manufacturers requirements.

3.07 PLY SHEET INSTALLATION

A. Install ply sheets per roofing system manufacturer's written instructions starting at low point of roofing system. Align base-ply sheets without stretching. Extend sheets over and terminate beyond cants.

1. Shingle side laps of ply sheets uniformly to ensure that required number of ply sheets covers substrate and insulation at any point. Shingle in direction to shed water.
2. Embed each ply sheet in a continuous void-free mopping of hot roofing asphalt to form a uniform membrane without glass-fiber ply sheets touching. Immediately broom sheets to ensure full adhesion.
3. Install additional ply sheet in waterways and valleys.

3.08 SBS-MODIFIED BITUMINOUS MEMBRANE INSTALLATION

A. Install modified bituminous roofing membrane cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants, installing as follows:

1. Unroll roofing membrane sheets and allow them to relax for minimum time period required by manufacturer.
2. Adhere cap sheet in cold processed adhesive according to manufacturer's written instructions for coverage rate and application.

- B. Laps:** Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Install roofing membrane sheets so side and end laps shed water. Completely bond and seal laps, leaving no voids.
1. Repair tears and voids in laps and lapped seams not completely sealed.
 2. Apply roofing granules to cover exuded bead at laps while bead is fluid.
 3. Use 75lb roller on all installed cap sheet to help ensure adhesion.

3.09 FLASHING AND STRIPPING INSTALLATION

- A. Install base flashing** over cant strips and other sloped and vertical surfaces, at roof edges, and at penetrations through roof; secure to substrates according to roofing system manufacturer's written instructions, and as follows:
1. Prime substrates with asphalt primer if required by roofing system manufacturer.
 2. Flashing Sheet Application: Adhere flashing sheet to substrate in cold-applied adhesive at rate required by roofing system manufacturer. Seal joints in flashing sheet.
- B. Extend base flashing up** walls or parapets a minimum of 12 inches (300 mm) above built-up roofing and 6 inches (150 mm) onto field of roof membrane. Extend base flashing under interior face of coping metal on bare walls.
1. Install 6 inch minimum skirt metal under interior face of coping and secure with fasteners with neoprene washers. Ensure fasteners engage coping metal, skirt metal, TPA base flashing and substrate.
- C. Flashing Sheet Top Termination:** Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
1. Seal top termination of base flashing with a metal termination bar and joint sealant.
- D. Flashing Sheet Bottom Termination:** Adhere flashing sheet to roof membrane sheet continuously along bottom of flashing sheet.
1. Elastomeric Flashing Sheet: Heat weld vertical flashing joints. Seal bottom termination of base flashing by adhering to roofing membrane with a five-course application of Rock-It and Burmesh.
- E. Install two stripping plies** in hot asphalt to all metal flanges including where NRCA details call for one.
- F. Roof Drains:** Set 30 by 30 inch (760 by 760 mm) square metal flashing in bed of asphalt roofing cement on completed roofing membrane. Cover metal flashing with roofing membrane cap-sheet stripping and extend a minimum of 6 inches

beyond edge of metal flashing onto field of roofing membrane. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.

Install stripping according to roofing system manufacturer's written instructions.

3.10 COATING INSTALLATION

- A. Begin coating application** after manufacturer required roof system cure time.
- B. Prime roof system** with specified primer at 300 sq.ft. per gallon.
- C. Install Title 24 Compliant Coating** system according to manufacturer's written instructions.
 - 1. Install coating in two coats at a coverage rate of 1.5 gallons per 100sq.ft. per coat.
 - 2. Back roll both coats.

3.11 WALKWAY INSTALLATION

- A. Walkway Pads:** Install walkway pads using units of size indicated or, if not indicated, of manufacturer's standard size according to walkway pad manufacturer's written instructions.
- B. Set walkway pads** in cold-applied adhesive.

3.12 FIELD QUALITY CONTROL

- A. Roofing Inspector:** Owner will engage a qualified roofing inspector to perform roof tests and inspections and to prepare test reports.
- B. Roofing Inspector:** Contractor shall engage a qualified roofing inspector for a minimum of 15 full-time days on site to perform roof tests and inspections and to prepare start up, interim, and final reports. Roofing Inspector's quality assurance inspections shall comply with criteria established in ARMA/NRCA's "Quality Control Guidelines for the Application of Built-up Roofing."
- C. Final Roof Inspection:** Arrange for roofing system manufacturer's technical personnel to inspect roofing installation at commencement and upon completion.
 - 1. Notify Architect and Owner 48 hours in advance of date and time of inspection.
- D. Repair or remove and replace** components of built-up roofing where test results or inspections indicate that they do not comply with specified requirements.
 - 1. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.13 PROTECTING AND CLEANING

- A. Protect roofing system from** damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect 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.

END OF SECTION

ROOFING INSTALLER'S WARRANTY

A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

Owner: City of Ontario
Building Name(s):
Area of Work: All Sites
Acceptance Date:
Warranty Period:
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 he will, at his 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 74 mph (120 k/hr);
 - 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; and
 - 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 by:

Authorized Signature:
Name (printed or typed):
Title:
Date:

END OF SECTION

SECTION 12600

TELESCOPIC STANDS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. **Telescopic Gym Seating.** Includes multiple-tiered seating rows comprising of seats, deck components, understructure that permits closing without requiring dismantling, into a nested configuration for storing or for moving purposes.
 - 1. Operation: Manual.
 - 2. Wall-attached.

1.2 RELATED SECTIONS

- A. **Section 04220 Concrete Masonry Units:** For wall finishes adjacent to the telescoping stands.
- B. **Section 09250 Gypsum Wallboard:** For wall finishes adjacent to the telescoping stands.
- C. **Section 09645 Cushioned Wood Flooring Assemblies:** For floor finishes adjacent to telescoping stands.

1.3 SUBMITTALS

- A. **Submit under the provisions of Section 01300.**
- B. **Product Data:**
 - 1. Manufacturer's data sheets on each product to be used.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Typical installation methods.
- C. **Each Supplied Product:** Must have a current evaluation report issued by ICC Evaluation Services (ICC-ES) certifying it meets the structural design requirements of the current ICC 300 Standard for Bleachers, Folding and Telescopic Seating, and Grandstands, including every specified load combination.
- D. **Current Welding Certifications:** AWS or CSA.
- E. **Installer Information:** Name, Current Certification Number, and Product Qualifications.
- F. **Warranty Documents:** Manufacturers' standard.
- G. **Shop Drawings:** For telescoping stands in both stacked and extended positions.
 - 1. Show seat heights, row spacing and rise, aisle widths and locations, assembly dimensions, anchorage to supporting structure, material types, and finishes.
 - 2. Electrical: Indicate power supply requirements.
 - 3. Graphic Drawing Proofs and Layouts.
- H. **Samples:** For units with factory-applied finishes.

- I. **Operation and Maintenance Data:** For telescopic bleachers.
 - 1. Include Operations and Maintenance Manual.

1.4 QUALITY ASSURANCE

- A. **Manufacturer Qualifications:**
 - 1. The Manufacturer is to be a current Certified Welding Fabricator as defined by either AWS or CWB, or both.
 - 2. Comply with structural welding codes that are applicable to their products or materials.
 - 3. Welding Codes: As produced by AWS or CSA.
- B. **Installer Qualifications:** Company specializing in performing Work of this section with documented experience for projects of similar scope and complexity.
 - 1. Factory trained and certified by the Manufacturer.
- C. **Each Supplied Product:** Must have a current evaluation report issued by ICC Evaluation Services (ICC-ES) certifying it meets the structural design requirements of the current ICC 300 Standard for Bleachers, Folding and Telescopic Seating, and Grandstands, including every specified load combination.
- D. **Source Limitations:** Provide each type of product from a single manufacturing source to ensure uniformity.

1.5 PRE-INSTALLATION CONFERENCE

- A. **Convene a conference** approximately two weeks before the scheduled commencement of the Work. Attendees shall include Architect, Contractor and trades involved. The agenda shall include schedule, responsibilities, critical path items and approvals.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. **Deliver telescoping stands in manufacturers packaging** clearly labeled with manufacturer name and content.
 - 1. Deliver at a scheduled time for installation that will not interfere with other trades operating in the building whenever and wherever possible.
- B. **Store and handle** bleacher equipment in a manner to prevent damage and in compliance with manufacturer's written instructions and recommendations.
- C. **Protect from damage** due to weather, excessive temperature, and construction operations.

1.7 PROJECT CONDITIONS

- A. **Field Measurements:** Coordinate actual dimensions for construction affecting telescoping stands installation with accurate field measurements before fabrication.
 - 1. Document field measurements on final shop drawings.
 - 2. Coordinate field measurements and fabrication schedule with construction progress to avoid delay of Work.

1.8 WARRANTY

- A. **Manufacturer's Warranty:** Contact manufacturer for detailed warranty information.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Acceptable Manufacturer:** Hussey Seating Company
38 Dyer St. Ext.
North Berwick, ME 03906
Toll Free Tel: 800-341-0401
Tel: 207-676-2271
Web: <https://www.husseyseating.com>
1. Local Dealer – Herk Edwards, Inc. – Steve Saunders
20655 S. Western Ave., Suite 120
Torrance, CA 90501
Tel: 310-373-0543
E: ssaunders@herkedwards.com
- B. Requests for substitutions will be considered in accordance with the provisions of Section 01 60 00.

2.2 PERFORMANCE AND DESIGN REQUIREMENTS

- A. **Electrical Components, Devices, and Accessories:** Must be listed and labeled as defined in NFPA 70, by a qualified testing agency and marked for intended location and application.
- B. **Seating Layout:** Telescoping stands to comply with ICC 300 for year 2024 - Standard for Bleachers, Folding and Telescopic Seating, and Grandstands, except where additional requirements are indicated or imposed by authorities having jurisdiction.
- C. **Structural Performance:** Engineer, design, fabricate and install telescopic gym seating systems to the following structural loads without exceeding allowable design working stresses of materials involved, including anchors and connections. Apply each load to produce maximum stress in each respective component of each telescoping stand unit according to ICC 300.
- D. **Manufacturer's System Design Criteria:**
1. Gymnasium Seat Assembly; To support and resist, in addition to its own weight, the following forces:
 - a. Live Load: 120 lbs. per linear foot (1.75 kN per m) on seats and decking.
 - b. Uniformly Distributed Live Load: Not less than 100 lbs. per square foot (4.79 kN per sq m) of gross horizontal projection.
 - c. Parallel Sway Load: 24 lbs. per linear foot (0.35 kN per m) of row combined with the Uniformly Distributed Live Load as specified.
 - d. Perpendicular Sway Load: 10 lbs. per linear foot (0.15 kN per m) of row combined with the Uniformly Distributed Live Load as specified.
 - e. Parallel and Perpendicular Sway Loads: Are not applied concurrently.
 2. **Hand Railings, Posts and Supports:** To withstand the following forces applied separately:
 - a. Concentrated Load: 200 lbs. (0.89 kN) applied at any point and in any direction.
 - b. Uniform Load: 50 lbs. per foot (0.73 kN per m) applied in any direction.

3. **Guard Railings, Post and Supports:** To withstand the following forces applied separately:
- Concentrated Load, Top Rail: 200 lbs. (0.89 kN) applied at any point and in any direction along top rail.
 - Uniform Load, Top Rail: 50 lbs. per foot (0.73 kN per m) applied in any direction at top rail.
 - Uniform Load, Infill Panels: 50 lbs. (0.22 kN) applied on an area equal to 12 x 12 inch (305 x 305 mm) applied on all guardrail infill panels.

2.3 MATERIALS

A. **Wood:**

- Lumber: NIST PS 20. Southern pine complying with SPIB's "Standard Grading Rules for Southern Pine Lumber" for B and B (B and better) grade-of-finish requirements.
- Plywood: NIST PS 1, APA-grade trademarked. Grade: A-C.

B. **Steel:**

- Structural-Steel Shapes, Plates, and Bars: ASTM A36.
- Galvanized-Steel Sheet: ASTM A653, Grade 40 (276 MPa) coating designation G60.
- Uncoated Steel Strip; Non-Structural Components: ASTM A1011, Commercial Quality, Type B, Hot-Rolled Strip.
- Uncoated Steel Strip; Structural Components: ASTM A1011 Grade 33 (228 MPa), Grade 36 (249 MPa), Grade 40 (276 MPa), Grade 45 (311 MPa), or Grade 50 (345 MPa), Structural Quality, Hot-Rolled.
- Galvanized Steel Strip: ASTM A653 Grade 40 (276 MPa) or Grade 64 (441 MPa), structural quality, coating designation G60.
- Tubing: ASTM A500, cold formed; Grade B, or ASTM A513, 46 ksi min yield.

- C. **Polyethylene Plastic:** High-density polyethylene; injection molded, color-pigmented, textured, impact-resistant, and dimensionally stable.

2.4 TELESCOPIC STANDS

A. **Wall-Attached Telescoping Stands:** Forward-folding system.

- The rear of the understructure is permanently attached to the floor and to a wall.
 - The wall provides structural support and must support loads imposed by the telescoping stands.

1.5 DIMENSIONAL AND OPERATIONAL CRITERIA

A. **NORTH BANK Dimensions:**

- Model MAXAM26
- Stand Type: Wall Attached
- Bank Length: 62'-3"
- Number of Tiers: 3
- Row Spacing: 24 inches (610 mm).
- Row Rise: 9-5/8 inches (244 mm).
- Open Dimension: 6'-2 5/16"
- Closed Dimension: 3'-5"
- Overall Unit Height: 3'-0 3/8"
- Net Capacity: 108
- Gross Seats: 120
- Maximum Net Capacity with Flex Row Fully Recovered:

B. SOUTH BANK Dimensions:

1. Model MAXAM26
2. Stand Type: Wall Attached
3. Bank Length: 62'-3"
4. Number of Tiers: 3
5. Row Spacing: 24 inches (610 mm).
6. Row Rise: 9-5/8 inches (244 mm).
7. Open Dimension: 6'-2 5/16"
8. Closed Dimension: 3'-5"
9. Overall Unit Height: 3'-0 3/8"
10. Net Capacity: 108
11. Gross Seats: 120
12. Maximum Net Capacity with Flex Row Fully Recovered:

C. WEST BANK Dimensions:

1. Model MAXAM26
2. Stand Type: Wall Attached
3. Bank Length: 62'-3"
4. Number of Tiers: 4
5. Row Spacing: 24 inches (610 mm).
6. Row Rise: 9-5/8 inches (244 mm).
7. Open Dimension: 8'-2 5/16"
8. Closed Dimension: 3'-5"
9. Overall Unit Height: 3'-10"
10. Net Capacity: 142
11. Gross Seats: 160
12. Maximum Net Capacity with Flex Row Fully Recovered:

D. NORTHEAST BANK Dimensions:

1. Model MAXAM26
2. Stand Type: Wall Attached
3. Bank Length: 33-7 1/2"
4. Number of Tiers: 4
5. Row Spacing: 24 inches (610 mm).
6. Row Rise: 9-5/8 inches (244 mm).
7. Open Dimension: 8'-2 5/16"
8. Closed Dimension: 3'-5"
9. Overall Unit Height: 3'-10"
10. Net Capacity: 75
11. Gross Seats: 84

12. Maximum Net Capacity with Flex Row Fully Recovered:

E. SOUTEAST BANK Dimensions:

1. Model MAXAM26
2. Stand Type: Wall Attached
3. Bank Length: 33'-7 1/2"
4. Number of Tiers: 4
5. Row Spacing: 24 inches (610 mm).
6. Row Rise: 9-5/8 inches (244 mm).
7. Open Dimension: 8'-2 5/16"
8. Closed Dimension: 3'-5"
9. Overall Unit Height: 3'-10"
10. Net Capacity: 75
11. Gross Seats: 84
12. Maximum Net Capacity with Flex Row Fully Recovered:

2.6 OPERATIONAL CRITERIA

A. Operation: Manual.

1. Manual: User operates system by manually pulling/pushing each section with operating handles.

2.7 SEATING

A. Seating Type: Polymer Seat System.

1. Model: Courtside Collection XC10. Load tested to 600 lbs. (2.67 kN).
 - a. Seat Depth: 10 inches (254 mm). Seat Length: 18 inches (457 mm).
2. Material: Gas assist injection-molded HDPE; high density polyethylene.
 - a. Recyclable: 100 percent.
3. End Caps at Aisle End Locations: Integrally molded.
4. Recess Pockets for Seat Number and Row Letters: Integrally molded.
5. Rear Closure Panel at Back of Seat: Integrally molded. Allows "continuous clean sweep" of debris at deck level and minimizes visibility of structural ribbing.
6. Seat Numbers: Color: Black number over grey background.
7. Row Identification: Color: Black letter over grey background.

B. ADA Accessible Seating:

1. Locate first tier modular units to provide wheelchair-accessible seating at locations indicated on Drawings. Modular units are available in 2 seat to 7 seat sizes inclusive and are custom configured according to number of tiers, section size, aisle locations, etc.
 - a. Flex-Row Units: First row modular recoverable seating units.
 - 1) Closed Configuration: Accommodates persons requiring ADA spaces or other temporary space needs.
 - 2) Opened Configuration: For standard usage.
 - 3) Units are to have a handle for easy operation.

- 4) Full-surround steel skirting with a 3/4 inch (19 mm) floor clearance for safety and improved aesthetics. Color: Black.
- 5) End Cap for the Nose Beam: Injection molded. For safety and improved aesthetics. Color: Black.
- 6) Mechanical Positive Lock: When the Flex-Row system is in the open and closed position.
 - a) Handle: Unlocks the modular recoverable seating unit for operation.
- 7) Flex-Row can be utilized with the full system in the open or closed position.
- 8) The modular units are designed to achieve multi-use front row seating to accommodate team seating, ADA requirements, and facility specific requirements.
- 9) Flex-Row.

2.8 RAILS, PANELS AND STEPS

A. End Rails: Self-storing.

1. Starting no higher than the second tier, 42 inches (1066 mm) high above seat.
2. End Rail Material: 1.5 inch (38 mm) square steel tubing.
3. Baluster Material: 0.5 inch (13 mm) square steel.
 - a. Intermediate members attached with 4 inch (102 mm) sphere passage requirements.

B. Center Aisle Rails: Manual Rotating.

1. Single pedestal mount handrails, 34 inches (864 mm) high with terminating mid rail. Permanently attached handrail and mounted socket. Rail rotates in the socket for rail storage.
2. Rail is to deploy easily, lock in the use position, and require intent and effort to unlock, and return to the stowed position.
3. Ends of the Handrail: Return to the post and not extend away from it.
4. Not Acceptable: Rails having openings to avoid interference with closed decks.
5. Rail Material: 1.5 inch (38 mm) square steel tubing.

C. Steps:

1. Step Type: Sure-Step. Flip-up Front Aisle Step.
 - a. Permanently hinged to the front row. Ensures availability and ease of operation.
 - b. Two 3 inch (76 mm) diameter x 3/4 inch (19 mm) wide non-marking front wheels.
 - c. The system can operate with the Sure-Step in the stored or deployed position.
 - d. Edges are coined, hemmed or radiused with front edge rubber bumpers.
 - e. Abrasive-backed non-slip tread identifier on leading edge of nosing.
 - f. For Aisle Widths Greater Than 6 feet (1.8 m): Two side by side hinged steps are provided.
2. Step Type: Intermediate Aisle Steps.
 - a. Fully enclosed, at each vertical aisle.
 - b. End Caps: Full radius on all four edges.
 - c. Tread Surface: Abrasive Non-slip, Adhesive-backed.

2.9 COMPONENTS

A. Decking:

1. Material: Plywood. 5/8 inch (16 mm) thick AC grade tongue and groove Southern Yellow Pine with clear urethane, high gloss finish.

B. Understructure:

1. Finish: Rust-inhibiting black finish.
2. Hardware Finish: Zinc-plated, Rust inhibiting black finish.
3. Posi-locks and Other Surfaces: Powder coated black; Rust inhibiting black finish.
4. Nose Beam: ASTM A653 grade 40 (276 MPa) steel.
 - a. Continuously roll-formed closed tubular shape.
 - b. No steel edges exposed to spectators after product assembly.
 - c. Through-bolted fore/aft to deck stabilizers and frame cantilevers to create the deck structure.
5. Rear Riser Beam: ASTM A653 Grade 64 (441 MPa) steel.
 - a. Continuously roll-formed.
 - b. No steel edges exposed to spectators after product assembly.
 - c. Through-bolted fore/aft to deck stabilizers and frame cantilevers to create the deck structure.
6. Frame: Welded assemblies, one left hand and one right hand per tier, comprised of the following components:
 - a. Lower Track subassembly: ASTM A1011 Grade 50 steel.
 - 1) Continuous Positive Interglide System (casterhorn) interlocks each adjacent frame casterhorn using an integral, continuous, anti-drift feature and captive interlock with adjustable row spacing at front to prevent separation and misalignment.
 - b. Lower Track Wheels: 3 per frame.
 - 1) 5 inch (127 mm) diameter by 1-1/4 inch (32 mm) wide with non-marring soft rubber face to protect wood and synthetic floor surfaces.
 - 2) Bushings: Molded-in sintered iron and oil-impregnated. To fit 3/8 inch (10 mm) diameter axles. Secured with E-type snap rings.
 - a) Option: up to 6 wheels per frame for load distribution.
 - c. Slant Columns: A500 Grade, tubular shaped steel.
 - d. Cantilever Subassembly: Consists of ASTM A1011 Grade 50 steel nose connection plate, cantilever, and riser attachment plate welded together into a subassembly.
7. Lock System: Casterhorns at the end sections of powered banks (minimally), and manual sections, contain a Low Profile Posi-Lock LX to lock each row in the open position and allow unlocking automatically. Adjustable stops to allow field adjustment of row spacings.
8. Sway Bracing: ASTM A653 grade 40 (276 MPa) steel, tension members bolted to columns.
9. Deck Stabilizer: A1011 Grade 45 steel member, through-bolted to nose and riser at three locations per section. Securely captures front and rear edge of decking at rear edge of nose beam and lower edge of riser beam for entire length of section. Interlocks with adjacent stabilizer on upper tier using low-friction nylon roller to prevent separation and misalignment.

- C. Fasteners: Vibration proof, in manufacturer's standard size and material.

2.10 FABRICATION

- A. **Fabricate understructure** from structural-steel members in size, spacing, and form required to support design loads specified in referenced safety standard.
- B. **Welded understructure** to comply with applicable AWS standards.
- C. **Round corners and edges** of components and exposed fasteners to reduce snagging and pinching hazards.

- D. **Form exposed sheet metal** with flat, flush surfaces, level and true in line, and without cracking and grain separation.

2.11 ACCESSORIES

- A. **Operating Handles for manual applications:** 3/4 inch (19 mm) OD steel tubing.
1. Handles are to engage at the first tier.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. **Do not begin installation** until the substrates have been properly constructed and prepared.
1. Examine areas where telescoping stands are to be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
2. Tolerances:
a. Flooring: Level and within 1/8 inch (3 mm) in 8 feet (2438 mm).
b. Rear Wall: Plumb within 1/8 inch (3 mm) in 8 feet (2438 mm).
- B. **If substrate preparation** is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. **Clean surfaces** thoroughly prior to installation.
- B. **Prepare surfaces** using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. **Install in accordance with manufacturer's instructions**, approved submittals, and in proper relationship with adjacent construction.
1. Comply with referenced safety standards.

3.4 FIELD QUALITY CONTROL

- A. **Field Inspection:** Coordinate field inspection in accordance with appropriate sections in Division 01.
- B. **Manufacturer's Services:** Coordinate manufacturer's services in accordance with appropriate sections in Division 01.

3.5 ADJUSTING AND CLEANING

- A. **On completion of installation**, lubricate, test, and adjust each telescoping stand unit so that it operates according to manufacturer's written operating instructions.
- B. **Clean installed telescoping stands** on exposed surfaces. Touch up shop-applied finishes or replace components as required to restore damaged or soiled areas.

3.6 MAINTENANCE SERVICE

- A. **Service Capability:** Show proof of full-time service capability by factory certified technicians directly employed by the installer.
1. A four to eight-hour maximum on-site repair response is required during normal working hours, 8 a.m. to 5 p.m. weekdays (excluding holidays).
 2. All Full-Time Service Personnel shall be Factory Authorized and Trained.
 3. Provide proof of Service Capability and a list of service parts regularly maintained in inventory.

3.7 DEMONSTRATION

- A. **Engage a factory-authorized service representative** to train the Owner's maintenance personnel to adjust, operate, and maintain telescoping stands.

END OF SECTION

SECTION 15300
AUTOMATIC FIRE SPRINKLERS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Wet-pipe automatic fire sprinkler systems for new construction.
 - 2. Aboveground wet-pipe sprinkler system piping, fittings, valves, and accessories.
 - 3. Fire sprinkler heads for all hazard classifications.
 - 4. Alarm valves and water flow detection devices.
 - 5. Fire department connections (FDC).
 - 6. System risers, control valve assemblies, and trim.
 - 7. Seismic bracing and restraints for sprinkler piping per NFPA 13 (2025) Chapter 18 and ASCE 7-22.
 - 8. Testing, flushing, and commissioning.
 - 9. Access panels for concealed valves and equipment.
 - 10. Underground piping corrosion protection.
- B. Regulatory Framework:
 - 1. California Building Code (CBC) 2025: Title 24, Part 2, Chapter 9 - Fire Protection and Life Safety Systems.
 - 2. California Fire Code (CFC) 2025: Title 24, Part 9.
- C. Work or equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided by the Contractor and incorporated under this Section of the work at no additional cost to the Owner.

1.02 DEFINITIONS

- A. AHJ: Authority Having Jurisdiction.
- B. AFSS: Automatic Fire Sprinkler System.
- C. CBC: California Building Code (Title 24, Part 2).
- D. CFC: California Fire Code (Title 24, Part 9).
- E. CAC: California Administrative Code (Title 24, Part 1).
- F. FDC: Fire Department Connection.
- G. LFA: Local Fire Authority. Local fire department or fire marshal with jurisdiction over ongoing fire safety inspections after building occupancy.
- H. NFPA: National Fire Protection Association.
- I. PIV: Post Indicator Valve.

- J. Supplemental Sprinkler: Per NFPA 13 (2025) Section 3.3.223.3.6, a sprinkler installed below an obstruction greater than 4 feet wide.
- K. Area of Discharge: Per NFPA 13 (2025) Section 3.3.8, the floor area covered by a sprinkler that takes into account walls or obstructions whose summation determines the remote area.

1.03 SYSTEM DESCRIPTION

- A. General: Complete wet-pipe automatic fire sprinkler system(s) complying with NFPA 13 (2025) and all applicable California codes.
- B. System Type: Wet-pipe sprinkler system with piping containing water at all times. Water discharges immediately upon activation of individual sprinkler heads.
- C. Occupancy Hazard Classifications are indicated on Drawings for each area.
- D. It shall be the Contractor's responsibility to identify any areas requiring other than a wet automatic fire sprinkler system due to occupancy type, storage of materials, or climatic conditions (below 40 degrees F at sprinkler pipe locations). These special requirements shall be incorporated into the automatic fire sprinkler design as necessary to conform with NFPA 13 (2025), Owner's Insurance Underwriter, and all other governing authorities.

1.04 REFERENCES

- A. National Fire Protection Association (NFPA):
 - 1. NFPA 13 (2025): Standard for the Installation of Sprinkler Systems.
 - 2. NFPA 14 (2025): Standard for the Installation of Standpipe and Hose Systems.
 - 3. NFPA 24 (2025): Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
 - 4. NFPA 25: Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, California Edition, as adopted by CFC 2025.
 - 5. NFPA 72 (2025): National Fire Alarm and Signaling Code.
- B. American Society of Civil Engineers (ASCE):
 - 1. ASCE/SEI 7-22: Minimum Design Loads and Associated Criteria for Buildings and Other Structures (seismic design requirements).
- C. ASTM International:
 - 1. ASTM A53/A53M (latest edition): Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 2. ASTM A135/A135M (latest edition): Standard Specification for Electric-Resistance-Welded Steel Pipe.
 - 3. ASTM A795/A795M (latest edition): Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.
 - 4. ASTM A536: Standard Specification for Ductile Iron Castings.
- D. American National Standards Institute (ANSI):

1. ANSI/AWWA C110: American Water Works Association - Ductile-Iron and Gray-Iron Fittings.
 2. ANSI/AWWA C151/A21.51: Ductile-Iron Pipe, Centrifugally Cast.
 3. ANSI/AWWA C104: Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
 4. ANSI/AWWA C111/A21.11: Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 5. ANSI/AWWA C105/A21.5: Polyethylene Encasement for Ductile-Iron Pipe Systems.
 6. ASME B16.1: Gray Iron Pipe Flanges and Flanged Fittings.
 7. ASME B16.3: Malleable Iron Threaded Fittings, Classes 150 and 300.
 8. ASME B16.9: Factory-Made Wrought Buttwelding Fittings.
- E. Underwriters Laboratories (UL):
1. UL 199: Standard for Automatic Sprinklers for Fire-Protection Service.
 2. UL 262: Standard for Gate Valves for Fire-Protection Service.
 3. UL 312: Standard for Check Valves for Fire-Protection Service.
 4. UL 789: Standard for Indicator Posts for Fire-Protection Service.
- F. Factory Mutual (FM) Global:
1. FM Approvals: Products listed in Approval Guide for fire protection equipment.
- G. California Codes and Regulations:
1. California Building Code (CBC) 2025: Title 24, Part 2.
 2. California Fire Code (CFC) 2025: Title 24, Part 9.
 3. California Mechanical Code (CMC) 2025: Title 24, Part 4.
 4. California Plumbing Code (CPC) 2025: Title 24, Part 5.
 5. California Administrative Code (CAC) 2025: Title 24, Part 1.
 6. California Code of Regulations, Title 19, Division 1: State Fire Marshal.
 7. California Health and Safety Code Sections 13195-13196.5.
- H. American Welding Society (AWS):
1. AWS D10.9: Qualification of Welding Procedures and Welders for Piping and Tubing.
- 1.05 ADMINISTRATIVE REQUIREMENTS
- A. Contractor Submittal Requirements:
1. Installer Qualifications:
 - a. C-16 Fire Protection Contractor license documentation.
 - b. OSFM fitter certifications for all installers per Cal Fire Information Bulletin 17-002.

2. Water Flow Test Data: Provide flow test "wet" signed by water purveyor or local fire authority.
- D. Field Coordination:
 1. Contractor shall verify all dimensions and conditions prior to installation.
 2. Report any conflicts or discrepancies between Contract Documents and field conditions to Engineer immediately.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications:
 1. Fire Sprinkler Contractor: California State Contractors License Board C-16 Fire Protection Contractor license.
 2. Underground Contractor: California State Contractors License Board C-34 Pipeline Contractor license or C-16 license.
 3. Fire Sprinkler Fitters: Certified by Cal Fire-Office of the State Fire Marshal per Information Bulletin 17-002. All persons who plan, lay out, fabricate, install, alter, or repair water-based fire protection systems must be OSFM-certified.
 4. Installing contractor shall have prior experience in similar scope of this project within the last 5 years.
- B. Product Listings:
 1. All fire sprinkler system components shall be listed by a nationally recognized testing laboratory:
 - a. Underwriters Laboratories (UL).
 - b. Factory Mutual (FM) Global.
 2. Products shall be used only within the limitations of their listing.
 3. Verify product listings match those specified in Contract Documents.
- C. Installation Quality:
 1. Contractor shall use materials and products as specified or approved equal.
 2. Workmanship shall comply with NFPA 13 (2025) requirements.
- E. Uninspected Work:
 1. Contractor shall not allow or cause any work to be covered up or concealed until it has been inspected, tested, and approved by all authorities having jurisdiction.
 2. Should any work be covered up or concealed before such inspection, Contractor shall, at Contractor's own expense, uncover the work to the satisfaction of the City Inspector. All related costs shall be borne by the Contractor.

1.07 SUBMITTALS

- A. Product Data Submittals (Prior to Installation):
 1. Submit product cut sheets for all components to Engineer for verification of compliance with Contract Documents:

- a. Sprinkler heads (all types and temperature ratings).
 - b. Alarm valves and trim.
 - c. Check valves and control valves.
 - d. Waterflow switches and tamper switches.
 - e. Fire department connections.
 - f. Hangers and seismic bracing components.
 - g. Pipe and fittings.
 - h. Grooved coupling systems.
 - i. Access panels.
 2. Shop Drawing Submittal for Architect's Review and Approval. Reference Sheet F2.1 for proposed layout of sprinkler heads. Coordinate layout with Sheet A2.3 Reflected Ceiling Plan and Sheet E2.1 and E2.2 Lighting and Power and Signal Plan. Contractor to use this layout when preparing shop drawing for review by Architect. Contractor's shop drawing for the layout must be approved by the Architect prior to submittal to the City of Ontario for review and approval by the Building Department.
 3. Substitution Requests: If proposing products are different from those specified, submit substitution request with complete technical data demonstrating equivalence. Substitutions require Engineer approval.
 4. Product data submittals are for verification only and do not constitute approval to deviate from specified products. Where submitted products differ from those specified, a substitution request is required.
 5. Submittals will be checked for general conformance with the design concept of the project, but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
- B. Qualification Submittals:
1. Contractor Qualifications: C-16 license documentation.
 2. Fitter Certifications: OSFM certification documentation for all installers.
 3. Manufacturer Certifications: Written statements from manufacturers certifying products are suitable for intended application.
- C. Pre-Installation Submittals:
1. Water Flow Test: Provide current test data "wet" signed by water purveyor or LFA.
- D. Closeout Submittals:
1. As-Built Drawings: Provide record drawings marked up to show actual installed conditions including:
 - a. Any field-approved deviations from Contract Documents.
 - b. Actual sprinkler head locations if adjusted for field conditions.
 - c. Actual seismic brace locations.

- d. Final pipe routing if modified.
2. Completed Test Reports:
 - a. Hydrostatic test certificates.
 - b. Flushing reports.
 - c. Functional test reports (alarms, drains, tamper switches).
3. Contractor's Material and Test Certificate: Per NFPA 13 (2025) Chapter 29 and CCR Title 19 requirements.
4. Operation and Maintenance Manuals: Including:
 - a. System description and operation.
 - b. Component information and replacement parts.
 - c. Testing and maintenance schedules per NFPA 25 California Edition.
 - d. Emergency procedures.
5. Spare Parts: Provide spare sprinkler cabinet with:
 - a. Minimum 6 spare sprinklers of each type/temperature rating installed, or quantity per NFPA 13 Table 6.2.9, whichever is greater.
 - b. Sprinkler wrench for each type of sprinkler.
 - c. Mounted in readily accessible location per NFPA 13 (2025) Section 6.2.9.
 - d. List of sprinklers in cabinet posted inside cabinet door.
6. Warranty Documentation: Written warranty from Contractor.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 1. Deliver materials in original, unopened containers with manufacturer's labels intact.
 2. Verify all materials match approved submittals.
 3. Inspect materials upon delivery for damage.
- B. Storage:
 1. Store materials in clean, dry, protected location.
 2. Protect sprinkler heads from physical damage.
 3. Store pipe elevated off ground on suitable supports.
 4. Protect threaded ends and grooves from damage.
- C. Handling:
 1. Handle materials carefully to prevent damage.
 2. Do not drop or throw sprinkler heads.
 3. Protect glass bulbs and fusible elements from damage.
 4. Sprinklers that have been dropped, damaged, have cracked bulbs, or show visible loss of fluid shall not be installed.

1.09 PROJECT CONDITIONS

A. Environmental Conditions:

1. Wet-pipe systems shall only be installed in areas where ambient temperatures remain above 40 degrees F (4 degrees C).

B. Field Measurements:

1. Verify field dimensions and conditions prior to fabrication.
2. Coordinate ceiling heights, structural conditions, and obstructions.
3. Coordinate with other trades for available space.

C. Seismic Design Requirements:

1. Building Location: Seismic Design Category as determined by project-specific geotechnical data and ASCE 7-22 for the applicable Risk Category, but no less than SDC D per CBC Section 1613A.2.5. Refer to project structural documents for site-specific seismic design parameters.
2. Seismic bracing is required for all fire sprinkler systems.
3. Component Importance Factor (Ip): 1.5 for fire sprinkler systems per ASCE 7-22.

1.10 COORDINATION

A. General Coordination:

1. Coordinate with Architect for:
 - a. Reference Sheet F2.1 for proposed layout of sprinkler heads. Contractor to use this layout when preparing shop drawing for review by Architect. Contractor's shop drawing for the layout must be approved by the Architect prior to submittal to the City of Ontario for review and approval by the Building Department.
 - b. Finish color requirements for exposed sprinklers and piping.
 - c. Finish color requirements for concealed type sprinkler head cover plates.
 - d. Routing of pipe in exposed areas subject to Architect's approval.
2. Coordinate with Structural Engineer for:
 - a. Penetrations through structural members.
3. Coordinate with Plumbing/Civil Engineer for:
 - a. Water supply connection and backflow prevention.
 - b. Underground piping connections.
4. Contractor shall cooperate and coordinate work with all other trades. Piping runs found to be in conflict with the work of other trades, as a result of neglected coordination, shall be removed and reinstalled in new locations designated by the Architect at no additional cost to the Owner.
5. To achieve coordination, Contractor shall contact the Architect and obtain necessary information to design the system to fit into allotted spaces without interfering with work by other trades.

B. Fire Alarm Coordination:

1. Connect waterflow switches to building fire alarm system.
2. Connect tamper switches on all control valves to fire alarm system.
3. Coordinate supervision requirements with fire alarm contractor.
4. All required alarm devices including flow switches and tamper switches shall be provided and installed by the automatic fire sprinkler contractor. All associated conduit, wiring, and electrical connections between such devices and the fire alarm system shall be the responsibility of the fire alarm contractor.

1.11 PROTECTION

- A. All work, equipment, and materials shall be protected at all times. Contractor shall repair all damage caused either directly or indirectly by Contractor's own workers. Contractor shall also protect installed work from damage. Close all pipe openings with caps or plugs during installation. Protect all equipment and materials against dirt, water, chemical, and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until written notice of acceptance from the Engineer.

1.12 WARRANTY

- A. Contractor's Warranty:
1. Provide written warranty covering materials and workmanship for minimum 1 year from date of project certification.
 2. Warranty shall cover repair or replacement of defective materials and correction of defective workmanship at no additional cost to Owner.
 3. If during the warranty period any material, equipment, or any part of the system fails to function properly, Contractor shall make good the defects promptly and without any expense to the Owner.
- B. Manufacturer's Warranties:
1. Provide all manufacturer's warranties for system components.
 2. Sprinkler heads: Provide manufacturer's standard limited lifetime warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: The following manufacturers are listed as basis of design. Other manufacturers producing equivalent products listed by UL or FM may be submitted for approval.
- B. Sprinkler Heads:
1. Viking Corporation.
 2. Tyco Fire Products (Johnson Controls).
 3. Reliable Automatic Sprinkler Co., Inc.
- C. Valves and Trim:

1. Viking Corporation.
 2. Tyco/Potter Roemer.
 3. Reliable Automatic Sprinkler Co., Inc.
 4. Kennedy Valve Company.
 5. Nibco.
- D. Pipe and Fittings:
1. Bull Moose.
 2. Victaulic Company (grooved fittings).
 3. Anvil International (threaded fittings).
 4. Johnson Controls (Grinnell) grooved fittings.
 5. Victaulic Company (mechanical tee branch outlets).
- E. Hangers and Seismic Bracing:
1. Anvil International.
 2. B-Line (Eaton).
 3. Tolco (Eaton).
 4. Unistrut.
- F. Access Panels:
1. Smith (Model 4762): Stainless steel (Type 304), vandal-proof Allen wrench lock – for locations requiring stainless steel per Article 2.12.
 2. Elmdor (Model DW-SS-AKL): Stainless steel construction with Allen key latch.
 3. Elmdor (Model DW-AKL): Galvannealed steel with Allen key latch – for drywall applications where stainless steel is not required.
- G. Seismic Expansion Joints:
1. Metraflex, MLU series, UL listed.

2.02 UNDERGROUND PIPING

- A. Main Water Services Below Grade:
1. Pipe shall be ductile iron, cement lined with mechanical joint fittings Class 250, flanged or mechanical joint, in accordance with ANSI/AWWA C111/A21.11, Class 52 or AWWA C153 ductile iron compact fittings of dimensions to match pipe outside diameter, with AWWA C104 cement lining and AWWA C111 neoprene gaskets.
 2. Provide concrete thrust blocks at all underground fittings per manufacturer's recommendations.
- B. In-Building Fire Service Riser (from underground entry to aboveground system):
1. Ames (Watts Water Technologies) or approved equal.
 2. Type 304 stainless steel.
 3. Minimum 200 PSI working pressure.

4. UL listed and FM approved for fire protection service.

2.03 PIPING AND FITTINGS

A. Steel Pipe - Aboveground:

1. Schedule 40 black steel pipe per ASTM A53 or ASTM A795:
 - a. 1 inch through 1-1/2 inches: Threaded joints.
2. Schedule 10 black steel pipe per ASTM A135 or ASTM A795:
 - a. 2 inches and larger: Grooved mechanical joints only.

B. Fittings - Threaded:

1. Cast iron or malleable iron conforming to ASME B16.3 (malleable iron) or ASME B16.4 (gray iron).
2. Class 150 minimum.
3. Black finish for standard applications.

C. Fittings - Grooved Mechanical:

1. Listed rigid and flexible couplings per application.
2. Rigid couplings: Use for standard runs and where rigidity is required.
3. Flexible couplings: Use at equipment connections, building expansion joints, and seismic separation joints.
4. Gaskets: EPDM rated for potable water service. Gaskets shall be molded and produced by the coupling manufacturer.
5. Housing: Ductile iron per ASTM A536, Grade 65-45-12; or ASTM A47 Grade 32510 malleable iron; or ASTM A53 fabricated steel fittings with grooves designed to accept grooved end couplings.
6. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from end to groove.

D. Fittings - Mechanical-Tee Branch Outlets:

1. UL Listed and FM Approved for fire sprinkler service.
2. Mechanical tees may be used to form branch outlets from steel pipe mains and branch lines in wet-pipe sprinkler systems where permitted by NFPA 13 and the fitting listing.
3. Mechanical tees shall be installed only on pipe sizes and wall thicknesses permitted by the fitting manufacturer.
4. Outlets shall be threaded or grooved as required to match the connected piping.
5. Mechanical-tee outlets shall not be used where prohibited by sprinkler manufacturer listings.

E. Flanged Fittings:

1. Cast iron, class 125, conforming to ASME B16.1.
2. Provide flanged connections where required.

F. Welded Fittings:

1. Wrought steel conforming to ASME B16.9.
 - G. Pipe Nipples:
 1. Factory fabricated, Schedule 40 black steel.
 2. Brass nipples at sprinkler drops in armover configurations.
 - H. Unions:
 1. 150 PSI malleable iron, black or galvanized to match pipe.
 2. Provide at equipment connections for maintenance accessibility.
 - I. One-piece reducing fittings shall be used wherever a change is made in pipe size. Bushings and reducing couplings shall not be permitted.
 - J. Close nipples and threaded unions are prohibited. Where a threaded union or coupling is needed, a groove type fitting shall be used.
 - K. Plain-end locking fittings are prohibited.
 - L. Fittings for hole-cut connections are not acceptable and shall not be used.
 - M. Flexible piping is not acceptable and shall not be used.
- 2.04 DRAIN AND TEST PIPING
- A. Pipe: Schedule 40, galvanized steel, ASTM A-53.
 - B. Fittings: Cast iron, drainage pattern, standard weight, screwed.
- 2.05 SPRINKLER HEADS
- A. General Requirements:
 1. All sprinkler heads shall be listed by UL or FM for their intended application.
 2. All sprinkler heads shall be new.
 3. Sprinkler heads shall be compatible with pipe connection type.
 4. Sprinklers shall be glass bulb type.
 5. Sprinklers shall be same manufacturer throughout the project.
 6. Sprinkler head type, K-factor, rating, and response are scheduled on the drawings.
 - B. Concealed Pendent Sprinklers (Typical all ceiling pendants):
 1. Provide with matching cover plate in ceiling color.
 2. Cover plate release temperature: Shall be rated to release at a temperature lower than the sprinkler activation temperature, in accordance with the manufacturer's listing.
 3. Factory installed escutcheon and cover plate.
 - C. Sprinkler Finishes:
 1. Standard brass, chrome, or white factory finish as selected by Architect.
 2. Custom colors: Factory-applied finish. Field painting of sprinkler heads is not permitted.
 3. Exposed piping in finished spaces: Match sprinkler finish.

4. Corrosion-resistant finish shall be installed at exterior areas; finish shall be polyester or Teflon coating with matching escutcheon.
- D. Sprinkler Guards:
 1. Provide sprinkler guards where required by NFPA 13 (2025).
 2. Sprinkler guards shall utilize a bolt-on feature to the base of the sprinkler or be a factory-installed guard. Wire cage type, listed for fire sprinkler service.
- E. Temperature Ratings:
 1. Heads below finished ceilings and in all other occupied areas shall have an Ordinary temperature rating (155-165 degrees F) unless otherwise indicated on Drawings.
 2. Heads in unventilated, concealed, and void spaces shall have an Intermediate temperature rating (200-212 degrees F) unless otherwise required by code or indicated on Drawings.

2.06 ALARM VALVES AND TRIM

- A. Waterflow Alarm Devices:
 1. Vane-Type Waterflow Switch:
 - a. Listed for fire sprinkler service.
 - b. Retard feature: Adjustable, factory set at 30 seconds. Maximum retard setting shall not exceed 90 seconds.
 - c. Contact rating: Suitable for fire alarm panel.
- B. Inspector's Test Connection:
 1. Minimum 1-inch valve with orifice equivalent to smallest sprinkler in system.

2.07 VALVES

- A. Control Valves - General:
 1. All control valves shall be listed indicating-type valves.
 2. Minimum 175 PSI rated working pressure.
 3. All shutoff valves including PIV and backflow preventer shall be electronically supervised.
- B. OS&Y Gate Valves (Outside Screw and Yoke):
 1. UL listed, 175 PSI minimum working pressure.
 2. Iron body, bronze mounted.
 3. 2 inches and smaller: Threaded ends, solid wedge, rising stem, screw-in-bonnet, and malleable iron handwheel. Valves shall be capable of being repacked under pressure, with valve wide open.
 4. 2-1/2 inches and larger: Flanged ends, solid taper wedge, flanged bonnet with body and bonnet conforming to ASTM A126 Class B; replaceable bronze wedge facing rings; packing assembly consisting of cast iron gland flange, brass gland, packing, bonnet, and bronze bonnet bushing.
- C. Post Indicator Valves (PIV):

1. UL listed to UL 789.
 2. Wall post indicator valve (WPIV) or standard PIV as indicated.
 3. Clear "OPEN/SHUT" indicator window.
 4. Locking device for security.
- D. Butterfly Valves:
1. UL listed indicating butterfly valve for fire protection service.
 2. Grooved-end type for grooved piping systems.
 3. Gear operator for 6-inch and larger.
 4. Visual indicator for open/closed position, easily readable from floor level.
 5. Minimum 300 PSI rated working pressure for sprinkler risers; minimum 175 PSI for other locations.
 6. Weatherproof gearbox.
 7. Bubble-tight shutoff at rated working pressure.
 8. Corrosion resistant body coating per manufacturer's standard.
 9. DPDT supervisory (monitor) switch, compatible with building fire alarm system.
- E. Ball Valves:
1. UL listed for fire protection service.
 2. Use for 2-inch and smaller drain and test connections.
 3. Full port design.
- F. Globe or Angle Valves:
1. UL/FM listed for fire protection service.
 2. Bronze, 2 inches and smaller, screwed-in bonnet, threaded ends, rising stem.
- G. Check Valves:
1. UL listed to UL 312.
 2. Swing check type for horizontal installation.
 3. Grooved end or flanged end as required.
- H. Pressure Relief Valves: Provide listed pressure relief valves in accordance with NFPA 13 (2025) requirements for wet-system overpressure protection.
1. Minimum size: 1/2-inch (15 mm) NPT.
 2. Setpoint: 175 psig or 10 psig above the maximum normal static system pressure (downstream of any backflow/PRV that defines the zone).

2.08 FIRE DEPARTMENT CONNECTION

- A. General:
1. Provide fire department connection(s).
 2. Location: Visible and accessible from fire apparatus access road.

3. Per CBC Section 912: Coordinate thread type with local fire department.
- B. Wall-Mounted FDC:
 1. UL listed siamese connection.
 2. Two 2-1/2 inch female swivel inlets with threads matching local fire department (typically 2-1/2 inch NH).
 3. Brass body with chrome or satin finish.
 4. Clapper-type check valves in each inlet.
 5. Plugs or breakable caps with chains.
 6. Escutcheon plate with "AUTO SPKR" designation.
- C. Freestanding FDC:
 1. UL listed freestanding or post-type connection.
 2. Height: 36 to 42 inches to center of inlets.
 3. Concrete pad base or bollard protection as indicated.
- D. FDC Check Valve:
 1. Provide listed check valve in FDC supply pipe.
 2. Install between FDC and system riser.
- E. Signage:
 1. Provide identification sign per NFPA 13 and local fire department requirements.
 2. Sign shall indicate "AUTO SPKR" or "AUTOMATIC SPRINKLER".
 3. Comply with CBC Section 912.4 for FDC signage.

2.09 HANGERS AND SUPPORTS

- A. General Requirements:
 1. All hangers shall be listed for fire sprinkler service.
 2. Maximum hanger spacing per NFPA 13 (2025).
 3. Hanging, bracing, and supports shall be by one manufacturer and listed as an approved assembly.
- B. Hanger Types:
 1. Adjustable band hangers.
 2. Trapeze hangers: For multiple parallel runs.
- C. Hanger Rods:
 1. Minimum 3/8-inch diameter threaded rod for pipe 4-inch and smaller.
 2. Minimum 1/2-inch diameter threaded rod for pipe size 5-inch.
 3. Minimum rod sizes for pipe 6-inch and larger per NFPA 13 Table 17.2.1.1 (hanger rod sizes) and Table 17.2.3.5.1 (bolt/rod through steel).
- D. Maximum Hanger Spacing: Per NFPA 13 (2025).

- E. Size all anchors and fasteners per NFPA 13. All lag screws, bolts, and drive screws shall be installed as required by codes and accepted good practices. Pilot holes shall be drilled in all wood framing members as required by structural engineer. Under no circumstances shall lag screws or bolts be hammered or pounded into framing.

2.10 SEISMIC BRACING

- A. General Requirements:
 - 1. Seismic bracing shall comply with NFPA 13 (2025) Chapter 18 and ASCE 7-22.
- B. Brace Types:
 - 1. Lateral Braces: Resist horizontal seismic forces perpendicular to pipe.
 - 2. Longitudinal Braces: Resist horizontal seismic forces parallel to pipe.
 - 3. 4-Way Braces: Resist horizontal seismic forces in all directions.

2.11 SIGNAGE AND IDENTIFICATION

- A. General Requirements:
 - 1. Provide durable identification for sprinkler piping, control valves, test/drain assemblies, fire department connections, and riser room(s).
 - 2. Materials: Engraved rigid plastic or metal signs; corrosion-resistant wire/chain or mechanical fasteners; indoor/outdoor rated.
- B. Valve Signage:
 - 1. Provide a permanent sign at each sprinkler system control valve indicating:
 - a. Valve function.
 - b. System/zone designation served.
 - c. Portion of building served.
 - d. Associated drains or auxiliary equipment shutoff coordination as applicable.
 - 2. Minimum 1/2-inch white letters on red background, or per NFPA 170 and local fire authority requirements.
- C. Riser Room Signage:
 - 1. Hydraulic data nameplate at each riser showing:
 - a. Contractor's name and C-16 license number.
 - b. Date of installation.
 - c. Hazard classification.
 - d. Design density and area.
 - e. Hose stream allowance.
 - f. Total water demand (GPM at PSI).
 - g. Name of installing contractor's representative.
- D. Fire Department Connection Signage:

1. "AUTOMATIC SPRINKLER" or "AUTO SPKR" sign per CBC Section 912.4.
 2. Indicating signs directing fire department to FDC location if not visible from street.
- E. Pipe Identification Labels:
1. Red lettering on white background: "FIRE SPRINKLER" with directional arrows.
 2. Provide pipe labels on sprinkler mains, risers, and drains.
- 2.12 ACCESS PANELS
- A. General Requirements:
1. Provide access panels at all concealed valves, drain connections, and equipment requiring periodic access for inspection or maintenance.
 2. Square construction. Stainless steel (Type 304) at locations indicated on Drawings or where required by environmental conditions. Galvannealed steel acceptable at interior drywall locations where stainless steel is not required.
 3. Vandal-proof door lock operated by Allen wrench.
 4. Size: As required to provide adequate access to concealed components. Minimum 12 inches by 12 inches.
- 2.13 ESCUTCHEONS, SLEEVES, AND PENETRATION ACCESSORIES
- A. Sprinkler Escutcheons:
1. Pipe through ceilings at sprinkler head locations shall be furnished with a two-piece or fully concealed escutcheon.
 2. Escutcheons shall be identical and match throughout the building for each application type.
 3. Escutcheons in areas with finished ceilings: White, or as selected by Architect.
- B. Pipe Escutcheons:
1. Furnish and install steel chrome plated set screw type escutcheons on all exposed pipes passing through walls, floors, ceilings, and partitions.
- C. Sleeves:
1. Sleeves shall be provided for all pipes passing through walls, floors, and lath and plaster partitions and ceilings. For concrete construction, sleeves shall be set in forms before concrete is poured. Provide one-inch (1") clearance between sleeves and pipe.
 2. Where installed in fire-rated walls or floors, caulk space between pipe and sleeves with listed firestop sealant and fill material in accordance with the tested assembly.
 3. In slab construction, sleeves shall be Schedule 40 black steel pipe. Sleeves shall extend two inches (2") above finished floor and upper surface to be sealed with mastic.

2.14 ACCESSORIES

A. Automatic Air Venting Valve:

1. Basis of Design: PurgeNVent model 7900AAV or approved equal.
2. Automatic air venting valve for wet-pipe sprinkler systems.
3. Listed for fire sprinkler service.
4. Minimum 175 PSI working pressure.

B. Alarm Bell:

1. Basis of Design: Potter PBA-AC or PDC Series vibrating type bells as required by system design and power source at bell location.
2. Outdoor use requires weatherproof back box.
3. 10" bell, red finish.
4. Bell shall be located as required by authorities having jurisdiction and as acceptable to Architect, approximately 10'-0" above finished grade on exterior wall.

C. Pressure Gauges:

1. Install as required by code. UL approved four and one-half inch (4-1/2") dial type with a maximum limit of not less than twice the normal working pressure at the point where installed.
2. Bourdon Tube. Copper alloy C-type.
3. Pressure connection: copper alloy, 1/4" NPT lower mount.
4. Copper alloy movement.
5. Dial: White aluminum with stop pin; black and red lettering.
6. Black aluminum pointer.
7. Black polycarbonate base.
8. Snap in clear polycarbonate window.

D. Tamper Switches:

1. Listed for fire protection service.
2. Compatible with building fire alarm system.
3. Two-switch design (one for supervisory, one for trouble) where required by fire alarm system.

E. Supervisory Switches: SPST, normally closed contacts, designed to signal valve in other than full open position.

F. Sprinkler System Supervision Alarms:

1. All valves controlling the water supply for automatic sprinkler systems and water flow switches on all sprinkler systems shall be electrically supervised in accordance with CBC Section 903.4.
2. All required alarm devices including flow switches and tamper switches shall be provided and installed by the automatic fire sprinkler contractor. All associated conduit, wiring, and electrical connections between such

devices and the fire alarm system shall be the responsibility of the fire alarm contractor.

3. Refer to electrical drawings and specifications and fire alarm specifications for additional information.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Pre-Installation Verification:
 1. Verify all rough-in conditions are ready for sprinkler installation.
 2. Verify structural framing is complete and accessible.
 3. Verify ceiling heights match Drawings.
 4. Identify and document obstructions.
 5. Examine areas and conditions under which work shall be performed. Correct conditions detrimental to proper and timely completion of work. Do not proceed until unsatisfactory conditions have been corrected.
- B. Coordination Verification:
 1. Verify HVAC ductwork installation is coordinated.
 2. Verify electrical conduit routing is coordinated.
 3. Verify plumbing installations are coordinated.
- C. Water Supply Verification:
 1. Verify underground piping is complete and tested.
 2. Verify water supply pressure and flow match design requirements.
 3. Conduct final water flow test prior to system completion.

3.02 PREPARATION

- A. Protection of Work:
 1. Protect installed work from damage by other trades.
 2. Cap open pipe ends at end of each workday.
 3. Protect sprinkler heads from paint, debris, and physical damage.
 4. Sprinkler bulb protectors shall be removed by hand only after installation is complete and area is clean.
 5. Contractor shall be held responsible for all damage to equipment and material until written notice of acceptance from the Engineer.
- B. Pipe Preparation:
 1. Cut pipe square and deburr.
 2. Remove all cutting oil, debris, and foreign material.
 3. Remove scale and foreign matter from inside and outside of pipes before assembly.
 4. Prepare grooved ends per coupling manufacturer's requirements.

5. Clean and prepare threads for proper engagement.

3.03 INSTALLATION - GENERAL

- A. The Contractor shall furnish the services of an experienced Superintendent who shall be qualified in all phases of the work of this Section and who shall constantly be in charge of the work.
- B. All installations shall be per referenced standards. Follow manufacturer's directions and recommendations in all cases as required for all approvals and warranty enforcement.
- C. Any cutting of structure shall be subject to approval by the Architect. Beams, decks, and other structural components shall not be cut or altered in any way unless previously approved.
- D. Entire sprinkler system shall be installed in such a manner so that it can be drained in accordance with NFPA 13 (2025). Drains shall be located at suitable points as approved by Architect. No primary or auxiliary drain shall be located in any public area or electrical room. All drains shall discharge into dedicated receptors.
- E. No work shall be covered or enclosed until inspected, tested, and approved by Architect, City Inspector, and authority having jurisdiction.
- F. Sprinkler heads at finished ceilings and in exposed locations shall form a symmetrical pattern, carefully integrated into the ceiling layout. Heads shall be located at the centerline of ceiling tiles.
- G. Use best workmanship in the installation of all piping and in particular all piping exposed in areas having no suspended ceilings. Install all piping as high as possible and where possible, install branch piping between structural framing and run main piping only below beams.
- H. Sprinkler head layout must accommodate ceiling-mounted HVAC register and lighting locations. Coordination with work of these trades is the responsibility of Contractor.
- I. Without exception, no piping shall be run under or through any skylight or skylight well. Any additional upright or pendent sprinklers required by skylight locations shall be the responsibility of this Contractor.
- J. All penetrations of wall and/or floor assemblies shall be suitably sleeved, patched, and/or sealed in order to preserve fire rating, where applicable.

3.04 INSTALLATION - PIPING AND FITTINGS

- A. General Piping Requirements:
 1. Install piping per approved submittals.
 2. Provide auxiliary drains at all trapped piping per NFPA 13.
 3. Do not penetrate structural members without structural engineer approval.
 4. All drain valves shall be plugged and piped to accessible location. Those installed within walls shall be equipped with locking access panels.
- B. Threaded Joints:
 1. Apply pipe joint compound or Teflon tape to male threads only.
 2. Engage minimum number of threads per NFPA 13.

3. Do not back off fittings after threading.
- C. Grooved Joints:
1. Cut grooves per coupling manufacturer's requirements.
 2. Verify groove dimensions with go/no-go gauge.
 3. Lubricate gaskets per manufacturer's requirements.
 4. Tighten bolts evenly to proper torque.
 5. Grooved joints shall be installed in accordance with the manufacturer's latest published installation instructions.
- D. Mechanical-Tee Branch Outlets:
1. Install mechanical tees in accordance with the fitting manufacturer's installation instructions including:
 - a. Proper hole cutting or drilling procedures.
 - b. Correct gasket placement and bolt torque.
 - c. Pipe wall thickness limitations.
 2. Quality Control:
 - a. Inspect mechanical-tee installations for proper hole size, gasket seating, and bolt tightening.
 - b. Replace fittings installed on improperly prepared pipe.
- E. Welded Joints (Where Permitted):
1. Welding methods shall comply with AWS D10.9, Level AR-3 and ANSI B31.1.
 2. Contractor shall be responsible for all welded joints and any qualifying procedures or certification required for welders and related personnel.
 3. Joining Materials: Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials appropriate for the wall thickness and chemical analysis of the pipe being welded.
 4. Holes in pipe for welded outlets shall be cut to full inside diameter of fitting, prior to welding in place. Holes shall be free of slag and welding residue, and of smooth, continuous bore. Fittings shall not penetrate internal diameter of run piping. Holes shall be cut by hole saw or other rotary bit. Torch-cutting of holes is strictly prohibited.
 5. Clean interior of pipe after welding.
 6. All welded pipe shall be subject to inspection by authority having jurisdiction before it is installed. Provide documentation of acceptance at time of project close-out.
- F. Branch Line Installation:
1. Maximum deflection of branch lines: Per sprinkler listing.
 2. Support branch lines within 3 feet of sprinkler head.
 3. Armover unsupported length: Per NFPA 13 (2025) requirements for applicable pipe size.

G. Riser Installation:

1. Install risers plumb.
2. Provide base support for riser weight.
3. Install flexible coupling within 24 inches of top of riser.
4. Install 1/2-inch pressure relief valve at riser.

H. Drain Piping:

1. Sprinkler system shall be provided with complete drainage facilities in accordance with NFPA 13 and CBC standards.
2. System main drain shall be piped to nearest standpipe drain in riser room with air gap.

3.05 INSTALLATION - SPRINKLER HEADS

A. General Sprinkler Installation:

1. Install sprinkler heads only after rough-in piping is complete and flushed.
2. Use only manufacturer's recommended wrench for installation.
3. Do not grip or damage deflector, frame, or heat-responsive element.
4. Apply Teflon tape to threads per manufacturer's instructions.

B. Sprinkler Positioning:

1. Install sprinkler heads at locations, types, spacing, and deflector positions shown on approved submittals.
2. Position sprinkler deflectors parallel to ceiling.
3. Maintain clearances from obstructions per NFPA 13 (2025) Chapter 9.

C. Sprinkler spacing, coverage areas, and wall distances are indicated on Drawings and comply with NFPA 13.

D. Concealed and Recessed Sprinklers:

1. Install after ceiling is complete.
2. Verify proper fit and adjustment of escutcheon/cover plate.
3. Verify cover plate is properly seated and aligned.

E. Protection of Sprinklers During Construction:

1. Protect sprinkler heads with factory-provided caps until area is clean.
2. Replace any sprinkler that has been painted, damaged, or loaded.
3. Do not hang materials or equipment from sprinkler piping.

3.06 INSTALLATION - SEISMIC BRACING

A. Brace Installation:

1. Maximum angles per NFPA 13 (2025): 45 degrees from horizontal.
2. Minimum angles per NFPA 13 (2025): 30 degrees from horizontal for steel pipe.

B. Lateral Bracing:

1. First lateral brace within 6 feet of riser.
2. Brace to structure on opposite side of pipe from lateral load direction.
- C. Longitudinal Bracing: Maximum spacing per NFPA 13 (2025).
- D. Branch Line Restraints: Restrain branch lines at locations per NFPA 13 (2025).
- E. Flexible Couplings:
 1. Install flexible couplings within 24 inches of top of riser.
 2. Install at building expansion joints.
 3. At system riser after flange connection to in-building-riser and before check valve.
 4. Provide sway bracing as required by coupling locations.

3.07 INSTALLATION - VALVES AND ACCESSORIES

- A. Control Valve Installation:
 1. Install control valves in accessible locations.
 2. Provide minimum 18-inch clearance in front of valves.
 3. Install tamper switches on all control valves.
 4. Install valve position (open/closed) indicator.
- B. Fire Department Connection Installation:
 1. Mount FDC per manufacturer's requirements.
 2. Height: Inlets 18 inches minimum, 42 inches maximum above grade.
 3. Install check valve in FDC supply line.
 4. Provide signage per NFPA 13 and CBC requirements.
- C. Inspector's Test Connection:
 1. Install at hydraulically most remote point.
 2. Pipe discharge to exterior or visible drain location.
 3. Provide signage identifying test connection.
- D. Waterflow Switch Installation:
 1. Install per manufacturer's requirements.
 2. Connect to fire alarm system per Division 28 requirements.
 3. Set retard time per local fire authority requirements (typically 30-90 seconds).
- E. Pressure Relief Valve:
 1. Locate relief valve in riser room in a visible and accessible location.
 2. Provide clearance for inspection, service, and replacement without removing other equipment.
 3. Pipe relief valve discharge full size to a safe, observable location where discharge will not cause injury or property damage.
 4. Terminate discharge at an approved drain receptor with an air gap.

5. Testing:

- a. Provide a written test plan describing how hydrostatic testing will be performed without leaving the system unprotected at turnover.
- b. Where lockable relief valves are used for hydrostatic testing, lock/return valves to normal operating condition after testing and provide tamper-evident seal.
- c. At acceptance, verify: valve listing, size, nominal setting, discharge routing, and absence of leakage at normal system pressure.

- F. Local alarm bell shall be located so that it can be easily heard and seen by passersby and fire department personnel.

3.08 EXCAVATION, TRENCHING, AND BACKFILL

- A. Do all necessary trench excavation, backfilling, and compaction required for the proper laying of underground piping. Provide a 6" sand bed above and below piping and backfill with selected materials properly moistened and mechanically compacted to ninety percent (90%). Piping shall have a minimum of thirty-six inches (36") of cover.
- B. Concrete, anchor, and thrust blocks required for underground piping shall be provided under the work of this Section.

3.09 CORROSION PROTECTION

A. General:

1. Corrosion protection shall be provided for all below grade ductile iron piping and associated valves and fittings. Such piping shall be protected from corrosion by encasement in a polyethylene protective wrapping (polywrap). The polywrap shall provide a continuous barrier between the pipe and surrounding bedding and backfill.

B. Materials:

1. Polywrap shall be minimum 8 mil in thickness, group 2, linear low density, flat tube, natural (clear) virgin polyethylene film formed into tubes or sheets as required. Material shall meet or exceed the requirements of AWWA C105/A21.5 and ASTM D4976.
2. Polywrap shall be secured with 2-inch wide pressure sensitive plastic tape not less than 10 mils thick.

C. Installation:

1. The polyethylene tubing shall be cut into lengths approximately 2 feet longer than the pipe sections. With the pipe suspended from the center, the tube shall be slipped over the spigot end and bunched up between the point of support and the spigot end. After the pipe is installed into the bell of the adjacent pipe, the pipe shall be lowered to the trench bottom and the supporting sling removed. The tube shall be slipped along the full length of the barrel with enough left at each end to overlap the adjoining pipe about 1 foot.
2. Rips, punctures, or other damage to the tube shall be repaired with adhesive tape or pieces of tube material secured with tape. Bends and reducers in the line shall be covered with polyethylene in the same manner as pipe.

3. Valves, tees, crosses, and outlets shall be wrapped with flat sheets of the same material. The sheets shall be passed under valves and brought up around the body to the stem. Edges shall be brought together, folded twice, and secured with adhesive tape.

3.10 FABRICATION

- A. All pipe, fittings, etc. shall be prepared by qualified and trained personnel, experienced with the products involved, and the recommended methods of preparation. All cuts, threads, and grooves shall be made according to applicable codes, standards, and accepted good practices. Pipe shall be free of damage, flaws, and burrs. Threads and grooves shall not be excessively shallow or deep. Fittings shall be made onto pipe no tighter than necessary. Cracked or broken fittings shall be replaced by Contractor, without exception. Excess dope and oils shall be removed before shipment to job site.
- B. Service Connections: Coordinate exact location with contractor installing underground service main.

3.11 FLUSHING AND CLEANING

- A. Do not connect aboveground sprinkler system piping to the underground fire service lead-in until:
 1. Underground flushing and hydrostatic testing are completed and accepted per NFPA 24 and AHJ requirements.
 2. The Contractor's Material and Test Certificate for Underground Piping has been submitted.
- B. Underground Flushing Requirements per NFPA 13 (2025) Section 28.1 and NFPA 24:
 1. Flush all underground piping from water supply to system riser before connecting to aboveground piping.
 2. Minimum flushing flow rates to achieve 10 feet per second velocity:
 - a. 4-inch pipe: 390 GPM.
 - b. 6-inch pipe: 880 GPM.
 - c. 8-inch pipe: 1,560 GPM.
 3. Use burlap bags or strainers at flush outlet to capture debris.
 4. Continue flushing until discharge water is clear and free of debris.
 5. Underground flushing shall be witnessed by City Inspector.
- C. Aboveground Flushing Requirements per NFPA 13 (2025) Section 28.2:
 1. Flush all aboveground piping before installing sprinkler heads.
 2. Flush cross mains and feed mains through flushing connections.
 3. Branch lines may be flushed through end-of-line test connections or open fittings.
 4. Flush until water runs clear.
 5. Do not install sprinkler heads until flushing is complete.
- D. Flushing Connections per NFPA 13 (2025) Section 28.2.3:

1. Provide flushing connections at end of each cross main.
 2. Minimum flush connection size per pipe being flushed:
 - a. 2-inch and smaller pipe: Minimum 2-inch flush connection.
 - b. 2-1/2-inch to 3-1/2-inch pipe: Minimum 2-1/2-inch flush connection.
 - c. 4-inch and larger pipe: Minimum 4-inch flush connection.
 3. Properly restrain and secure all flushing piping and hoses.
- E. Documentation:
1. Document flushing operation including date, duration, and observations.
 2. Record flow rate achieved.
 3. Note clarity of water and any debris removed.
 4. Provide signed flushing certificate to City Inspector.
 5. Flushing certification is required before system acceptance.

3.12 HYDROSTATIC TESTING

- A. Hydrostatic Test Requirements per NFPA 13 (2025) Chapter 29:
1. Test all new piping and attached appurtenances after installation and before concealment.
 2. Test Pressure per Section 29.2.1.1:
 - a. Standard: 200 PSI (13.8 bar) for 2 hours.
 - b. High Pressure Systems: Where system working pressure exceeds 150 PSI, test at 50 PSI above maximum system working pressure for 2 hours per Section 29.2.1.3.
 3. Acceptance Criteria per Section 29.2.1.2: No loss in gauge pressure or visual leakage.
 4. Include Fire Department Connection (FDC) piping in hydrostatic test.
- B. Hydrostatic Test Procedure:
1. Install sprinkler heads after piping passes hydrostatic test, or use approved test plugs per Section 29.2.1.9.
 2. Fill system slowly from lowest point to allow air to escape through high point vents.
 3. Apply test pressure using calibrated hydrostatic test pump.
 4. Maintain test pressure for minimum 2 hours.
 5. Visually inspect all joints, fittings, and connections for leakage during test.
 6. Record pressure gauge readings at start and end of test.
 7. Confirm pressure at highest elevation meets requirements (elevation loss is acceptable per Section 29.2.1.6).
- C. Test Witnessing:
1. Coordinate with City Inspector for test witnessing.
 2. Provide minimum 48-hour advance notice before testing.

3. All hydrostatic tests shall be witnessed by City Inspector.
4. Have approved drawings available at time of test.
- D. Documentation:
 1. Complete hydrostatic test certificate.
 2. Record test pressure, duration, and gauge readings.
 3. Document pass/fail and any repairs made.
 4. Obtain City Inspector signature on test certificate.
 5. Certify that no additives, corrosive chemicals, sodium silicate, brine, or other corrosive substances were used for testing or stopping leaks.

3.13 SYSTEM FUNCTIONAL TESTING

- A. Main Drain Test per NFPA 13 (2025) Section 29.2.6:
 1. Conduct main drain test with City Inspector present.
 2. Procedure:
 - a. Record static pressure with main drain valve closed.
 - b. Open main drain valve fully.
 - c. Allow pressure to stabilize.
 - d. Record residual pressure with drain fully open.
 - e. Close main drain valve.
 3. Main drain shall be piped to exterior or visible interior drain.
 4. Document static and residual pressures on Contractor's Material and Test Certificate.
 5. Results establish baseline for future annual main drain tests per NFPA 25.
- B. Waterflow Alarm Test per NFPA 13 (2025) Section 29.2.5:
 1. Open inspector's test connection at hydraulically remote location.
 2. Verify waterflow switch activates and transmits signal to fire alarm panel.
 3. Record time from test valve opening to alarm activation (shall not exceed 90 seconds).
 4. Verify alarm bell sounds.
 5. Verify correct identification of each zone/device at fire alarm control panel.
 6. Close test connection and verify alarm restores.
- C. Tamper Switch Test per NFPA 13 (2025) Section 29.2.4:
 1. Verify all control valves are in normal (open) position.
 2. Close each control valve partially (two turns maximum from fully open).
 3. Verify tamper switch activates supervisory signal at fire alarm panel.
 4. Return valve to fully open position.
 5. Verify supervisory signal restores at fire alarm panel.
 6. Test each supervised valve individually.

- D. Backflow Preventer Forward Flow Test per NFPA 13 (2025) Section 29.2.9:
 - 1. Where backflow preventer is installed in sprinkler supply, conduct forward flow test.
 - 2. Flow water through system at system demand rate (or maximum achievable flow).
 - 3. Verify backflow preventer check valves operate correctly.
 - 4. Document test results.
- E. Fire Department Connection Test per NFPA 13 (2025) Section 29.2.3:
 - 1. Verify FDC clapper valves operate freely.
 - 2. Verify FDC check valve holds under system pressure.
 - 3. Verify FDC piping was included in hydrostatic test.
 - 4. Verify threads are compatible with local fire department.
 - 5. Verify signage is installed per NFPA 13 and CBC.
- F. Pressure Gauge Calibration per NFPA 13 (2025) Section 29.2.7:
 - 1. Verify all pressure gauges are installed per approved drawings.
 - 2. Gauges shall be listed and suitable for fire protection service.
 - 3. Calibrate or replace gauges not accurate within 3% of full scale.
- G. Sign and Nameplate Verification per NFPA 13 (2025) Section 29.2.8:
 - 1. Verify hydraulic design nameplate is installed at system riser.
 - 2. Verify all required signage is installed:
 - a. Control valve identification signs.
 - b. Fire department connection signs.
 - c. Inspector's test connection signs.
 - d. Spare sprinkler cabinet sign.
- H. Local Fire Authority Notification:
 - 1. Notify local fire authority of scheduled testing.
 - 2. Invite local fire authority to witness tests.
 - 3. Provide test results to local fire authority after acceptance.
- I. Deficiencies: Any deficiencies identified during testing shall be corrected and retested at no additional cost to the Owner until full compliance is achieved.

3.14 CONTRACTOR'S MATERIAL AND TEST CERTIFICATE

- A. Provide Contractor's Material and Test Certificate per NFPA 13 (2025) Chapter 29 including:
 - 1. Contractor's name, address, and C-16 license number.
 - 2. Name of property owner and property address.
 - 3. Description of work performed.
 - 4. Hazard classification(s).

5. Design criteria (density/area).
 6. Water supply data.
 7. Materials used (pipe, fittings, sprinklers, valves).
 8. Hydrostatic test results.
 9. Main drain test results.
 10. Flushing certification.
 11. Alarm device test results.
 12. Certification that installation complies with NFPA 13 and approved plans.
 13. Signature of contractor's authorized representative.
- B. Submit certificate to:
1. Owner.
 2. Local Fire Authority.

3.15 DEMONSTRATION AND TRAINING

- A. Owner Training:
1. Provide minimum 2-hour training session for Owner's maintenance personnel.
 2. Training topics shall include:
 - a. System overview and operation.
 - b. Location of control valves and components.
 - c. Emergency procedures.
 - d. Inspection, testing, and maintenance requirements per NFPA 25 California Edition.
 - e. Spare sprinkler head cabinet location and use.
 - f. When to contact fire sprinkler service contractor.
- B. Contractor-Provided Documentation:
1. Operation and Maintenance Manual including:
 - a. System description and operation.
 - b. Component information and replacement parts.
 - c. Recommended maintenance schedule per NFPA 25 California Edition.
 - d. Emergency procedures.
 2. Manufacturer's literature for all installed components.
 3. As-built drawings showing any deviations from Contract Documents and location of all system drawings.
 4. All test certificates and reports.
- C. Engineer-Provided Documentation (Included in Contract Documents):
1. Hydraulic calculations.

2. Seismic calculations.
3. Design drawings.

3.16 CLOSEOUT AND CLEAN-UP

A. Final Inspection:

1. Coordinate final inspection with City Inspector.
2. All punch list items shall be complete before final inspection.
3. Final acceptance of the fire sprinkler system shall be subject to approval by the AHJ. System shall not be placed in service until all testing and documentation have been approved.

B. Local Fire Authority Coordination:

1. Provide copies of all test reports to local fire authority.
2. Fire sprinkler system must be complete and operational before occupancy per CBC.
3. Ongoing inspection, testing, and maintenance becomes responsibility of Owner and local fire authority after project certification.

D. Cleaning:

1. Upon completion of the work specified, and at other times during the progress of the work when required, the Contractor shall remove all surplus materials, rubbish, and debris resulting from this work, and shall leave the entire building and involved portions of the site in a neat, clean, and acceptable condition.
2. Exposed metal work shall be carefully brushed down with steel brushes to remove rust and other spots and left smooth and clean.
3. Exposed parts which are to be painted shall be thoroughly cleaned of cement, plaster, and other materials, and all oil and grease spots shall be removed.

E. Final Approval:

1. Prior to final acceptance of the installation, the Contractor shall furnish to the Engineer certificates of approval signed by the authority having jurisdiction, stating that the systems, as installed, have been inspected and tested and meet all governing code requirements.
2. Provide three copies of final inspection and certification as required by Owner's Insurance Underwriter, and/or authorities having jurisdiction.
3. Submit two copies of guarantee.

END OF SECTION

SECTION 15400

PLUMBING

PART 1 - GENERAL

1.01 WORK INCLUDED

1. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.02 QUALITY ASSURANCE

- A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:
 1. C.C.R., Title 24, Part 5 (2022 CPC).
 2. 2022 California Plumbing Code.
 3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
 4. National Fire Protection Association.
 5. California State Division of Industrial Safety.
 6. County Health Department.
 7. Any other legally constituted body-having jurisdiction thereof.
- B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.03 DRAWINGS

- A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.
- B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.
- C. **Special Note:** Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field

conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

- D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.04 PERMITS, INSPECTIONS AND LICENSES

- A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.05 UTILITIES

- A. See Drawings for Points of Connection.
- B. Certain site utilities are to be connected to and extended. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact location and depth of lines to which he is to connect. In event depth of lines is not sufficient to permit connection in manner indicated, Contractor shall obtain direction from the Owner's representative before proceeding with this work.
- C. Verify that utility companies size their services and meters to suit ultimate demand indicated on the drawings.
- D. Gas Service and Meter Assembly: The Contractor shall arrange with the serving utility company for the installation of new gas service with complete meter assembly of the capacity indicated and in the location as shown on the drawings. All items served with gas shall be operated at full fire and adjusted by the Contractor. In cooperation with gas utility, make all required adjustments to main gas pressure regulators. The Owner shall pay for all required fees.
- E. Sanitary Sewer: The Contractor shall be responsible for the soil and waste piping outside of the building within five feet (5') of the foundation, and within the building itself. See Civil Engineer's plans for onsite
- F. Domestic Water: The Contractor shall be responsible for the domestic water service outside of the building within five feet (5') of the foundation, and within the building itself. See Civil Engineer's plans for onsite domestic water system.
- G. Storm Drain: The Contractor shall be responsible for the storm drain service outside of the building within five feet (5') of the foundation, and within the building itself. See Civil Engineer's plans for onsite storm drain system.

1.06 EXAMINATION OF PREMISES

- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.07 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.08 LOCATIONS

- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
- B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.
- C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.09 SUBMITTAL DATA (Also see General Conditions)

- A. Submittal Requirements:
 - 1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.
 - 2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
 - 3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
 - 4. To be valid, all submittals must:

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- a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.
 - b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
 - c. Include all pertinent construction, installation, performance and technical data.
 - d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
 - 1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
 - 2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.
 - e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

- 1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.
 - a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.
 - 1) In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".
 - b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

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2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
 3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
 4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
 5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
 6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.10 UNINSPECTED WORK

- A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.
- B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.11 RECORD DRAWINGS (Also see General Conditions)

- A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blue-line prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of re-producibles shall be delivered to the Architect.

1.12 GUARANTEES (Also see General Conditions)

- A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.
- B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

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- C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT (See Schedules on Drawings)

- A. **General:** All materials, as specified or required in the work, shall be new, free from defects and imperfections. All manufactured shall comply with California Assembly Bill 1953.
- B. Pipe and Fittings:
1. Soil and Waste Piping:
 - a. Soil and waste piping within the building itself and outside within five feet (5') of the foundation, shall be no-hub cast iron pipe and fittings, asphaltum coated, free from defects, and shall comply with CISPI. Standard 301, ASTM A-888 or ASTM A-74. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute. Fittings shall be made up with "Husky" SD 4000 series or "Clamp All" HI-TORQ 125 series stainless steel type 304 couplings and shall conform to ASTM C1540 & ASTM C564 except all above ground vent pipe fittings may be made with "Anaco" or "Tyler" stainless steel two band couplings conforming to CISPI Standard 310.
 2. Vent Piping:
 - a. Concealed or underground vent piping shall be cast iron pipe and fittings as specified for soil and waste piping.
 - b. Exposed vent piping shall be Schedule 40 galvanized steel pipe, ASTM A53, with black cast iron
 3. Domestic Water Piping:
 - a. Piping within the building and above grade shall be Type "L" ASTM B88, hard drawn copper tubing with wrought-copper, Solder-Joint Fittings ASME B16.22.
 - b. Outdoor underground piping in sizes 2-1/2" and 3" shall be Type "L" ASTM B88, hard drawn copper as specified for water piping within the building. Piping 2" and smaller shall be Type "K" ASTM B88, hard drawn copper with wrought copper sweat fittings ANSI B16.18 and B16.22.
 - c. Piping below the building floor shall be Type "K" soft annealed copper tubing with no fittings below the slab.
 4. Storm Drain Piping:
 - a. Concealed storm drain piping within the building itself and outside within five feet (5') of the foundation, shall be no-hub cast iron pipe and fittings, asphaltum coated, free from defects, and shall comply with CISPI. Standard 301, ASTM A-888 or ASTM A-74. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute. Fittings shall be made up with "Husky" SD 4000 series or "Clamp All" HI-TORQ 125 series stainless steel type 304

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- couplings and shall conform to ASTM C 1540 & ASTM C564.
- b. Exposed storm drain piping shall be Schedule 40 galvanized steel pipe, ASTM A53, with black cast iron recessed drainage fittings.
5. Indirect Waste Piping.
- a. Shall be Type "L" copper as specified for water piping.
6. Air Conditioning Condensate Drain Piping.
- a. Shall be Type "M" copper as specified for water piping.
7. All exposed piping at plumbing fixtures shall be chrome plated yellow brass except exposed pipes in shop or utility areas.
8. Unions or flanges shall be furnished and installed at each threaded connection to all equipment or valves. The unions or flanges shall be located so that the piping can be easily disconnected for removal of the equipment, tank, or valve, and shall be of the type specified in the following schedule.
- a. Unions:
 - 1) **Black Steel Pipe:** 250 pound screwed black malleable iron, ground joint, brass to iron seat.
 - 2) **Galvanized Steel Pipe:** 250 pound screwed galvanized malleable iron, ground joint, brass to iron seat.
 - 3) **Copper or Brass Tubing:** 150 pound cast bronze or copper, ground joint, nonferrous seat with ends, by Walseal, Nibco or Mueller.
 - b. **Flanges:** Tube Turn or approved equal, raised face 150 pound class forged steel, weld, neck or slip-on type conforming to ASA B16.5 and ASTM A181. For copper piping systems, provide flanges conforming to ANSI B16.24. The faces of the flanges being connected to be alike in all cases. Locate flanges so that the piping can be easily disconnected for removal of the equipment or valve. Gasket material shall be of material suiting the service of the opening system in which installed and which conforms to its respective ANSI Standard (A21.11. B16.21). Provide materials that will not be detrimentally affected by the chemical and thermal conditions of the fluid being carried.
9. All piping on roof shall be supported by pipe supports as manufactured by MAPA Products. Products by Miro Industries and Erico shall be accepted for submittal review.
- a. Pressurized Piping:
 - 1) For pipe sizes 1" and less: MS-1 single post, adjustable height pipe support.
 - 2) For pipe sizes 2 ½" and less: MS-4 adjustable, roller pipe support.
 - 3) For pipe sizes 4" and less: MS-5 adjustable, roller pipe support.
 - b. **Gravity System Piping 2" and Less:** MS-1 single post, adjustable height pipe support.

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10. All underground non-metallic piping shall have 14 gauge copper "Tracer Wire" continuous for entire length.
- C. Valves:
1. General:
- a. Piping systems shall be supplied with valves arranged so as to give complete and regulating control of each building and piping systems throughout the building, and located so all parts are easily accessible and maintained.
 - 1) Valve Design: Rising stem or outside screw and yoke stems. Non-rising stem valves may be used where space conditions prevent full extension of rising stems.
 - 2) Sizes: Same size as upstream pipe, unless otherwise indicated.
 - 3) Operators:
 - b. Hand wheels fastened to valve stem for all valves other than quarter turn.
 - c. Lever handles on quarter-turn valves, 6 inch and 8 inch and larger gear operated, except for plug valves. Provide plug valves with square heads and operating wrench.
 - d. Provide gear operator for valves 8 inch or larger.
 - 1) Extended stems: Where piping insulation is indicated or specified, valves shall be equipped with 2" extended handles of non-thermal conductive material. Also provide a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation. Supply with memory stops, which are fully adjustable after insulation is applied.
 - 2) End Connection: 2 inch and under shall be threaded, 2-1/2 inches and larger shall be flanged or full lug style.
 - e. Valves for Potable Water must comply with California Lead Free Law, effective January 1, 2010.
 - 1) *"Lead Free" refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content $\leq 0.25\%$. Source: California Health & Safety Code (116875).*
 - 2) *All valves must be 3rd party certified.*
 - 3) *Bronze valves shall be made with dezincification-resistant material.*
 - f. Where possible, valves of one manufacturer shall be used.
 - g. Provide Class 150 valves meeting the valve specifications where Class 125 valves are specified but are not available.
2. **Approved Manufacturers.** The following manufacturers (or equal) shall be accepted for submittal review provided that all features and options are equivalent to the corresponding items as specified.

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- a. General valves.
 - 1) NIBCO
 - 2) Hammond
 - 3) Milwaukee
 - b. Below grade domestic water shut-off valves (gate valves) 2" and larger.
 - 1) NIBCO.
 - 2) Clow.
 - 3) Mueller.
 - c. Butterfly Valves.
 - 1) NIBCO.
 - 2) Demco.
 - 3) Dezuric.
 - d. Plug Valves.
 - 1) Hammond.
 - 2) Milwaukee.
 - e. Check valves, lift type.
 - 1) Hammond.
3. Valves and cocks shall be installed in locations as indicated on plans per the following usage criteria:
- a. Below grade domestic water shut-off valves 1-1/2" and smaller.
 - 1) Gate valve.
 - b. Below grade domestic water shut-off valves 2" and larger.
 - 1) Resilient seated gate valve.
 - c. Above grade domestic water shut-off valves 2" and smaller.
 - 1) Ball valve.
 - d. Above grade domestic water shut-off valves 2-1/2" and greater.
 - 1) Butterfly valve.
 - e. Above grade gas shut-off cocks.
 - 1) Ball valve (for gas service).
 - f. Below grade gas shut-off cocks.
 - 1) Polyethylene ball valve (for gas service).
 - g. Check valves, general, horizontal.
 - 1) Check valve, swing type.
4. Gate Valves.
- a. Gate Valves, 1-1/2-Inch and Smaller.
 - 1) Rising Stem: Valves shall be Class 125 and 200 PSI CWP,

rising stem, union bonnet, solid wedge and manufactured in accordance with MSS-SP 80. Body, bonnet and wedge shall be of bronze ASTM B-62. Stems shall be of dezincification-resistant silicon bronze ASTM B-371 or low-zinc alloy B-99, non-asbestos packing and malleable or ductile iron hand wheel. Valve ends shall be threaded.

a) **Acceptable Valves:** NIBCO T124 (threaded), or approved equal.

2) **Non-Rising Stem:** Valves shall be Class 125 and 200 PSI CWP, non-rising stem, screw-in bonnet, solid wedge and manufactured in accordance with MSS-SP-80 and NSF-61-G. Body, bonnet, external stuffing box and wedge shall be of bronze ASTM B-584 C87850. Stems shall be of dezincification-resistant silicon bronze ASTM B-371 C69400 or ASTM B-99 C65100, Aramid Fibers with graphite packing and malleable iron hand wheel. Valve ends shall be threaded.

a) **Acceptable Valves:** NIBCO T113-LF (threaded), or approved equal.

b. Resilient Seated Gate Valves, 2-Inch and Larger.

1) Valves shall conform to AWWA C-509 and C515, fusion-bonded epoxy coating inside and out, meets or exceeds AWWA C-550, ductile iron body, rubber encapsulated D.I. wedge, rubber bonnet gasket, low torque operation, full diameter waterway, flanged, mechanical joint or ring-tite, UL/FM listed and approved. Provide complete with traffic weight cast iron valve box with cast iron cover and operating wrench.

a) **Acceptable Valves:** NIBCO F-607-RW OS&Y or F-609-RW NRS or M-609-RW, or approved equal by Clow or Mueller.

5. Ball Valves, 2 Inches and Smaller.

a. Valves shall be rated 250°F: 330 psig 600 PSI CWP, shall have 2-piece full port lead free dezincification resistant bronze bodies with TFE seats and seals, stainless steel stem, separate packing nut with blow-out proof adjustable stem packing, and vented stainless steel ball. Valves shall conform to ASTM B371 C69300, or ASTM B-584 C87850 and conform to MSS-SP-110 and NSF-61-G.

1) **Acceptable Valves:** NIBCO T-68580-LF (threaded), or approved equal.

6. Butterfly Valves, 2-1/2" and Larger.

a. Valves shall be rated 200 PSI, full lug Ductile Iron Body ASTM A-536, with 2" extended neck for insulation, EPDM liner, 416 Stainless Steel Stem, and Aluminum Bronze disc. All Butterfly Valves shall be suitable for bi-directional dead end service at valves rated pressure without the need for a down stream flange. Valves 6" and smaller shall be supplied with 10 position lever locking handle. Valves 8" and larger shall have enclosed weatherproof gear

operators and conform to MSS-SP 67.

- 1) **Acceptable Valves:** NIBCO LD 2000, or approved equal.
7. Check Valves, Swing-Type, 2" and Smaller.
 - a. Valves shall be Y-pattern swing-type manufactured in accordance with NSF-61-G and MSS SP-80, Class 125, Lead Free dezincification resistant bronze body ASTM B-584 C87850, with Nonmetallic TFE seat disc. Valve ends shall be threaded.
 - a. **Acceptable Valves:** NIBCO T413-Y-LF (threaded), or approved equal.
8. Combination Temperature and Pressure Relief Valves: Shall be McDonald, Watts, or approved equal, bronze body, test lever, thermostat, complying with ANSI Z21.22 listing requirements for temperature discharge capacity. Relief valves shall be factory set for 210 degree F. and 150 p.s.i. pressure. Relief valves shall be type as recommended by water heater manufacturer.
- D. **Water Pressure Regulators:** Shall be of the manufacturer, model and sizes as indicated on the drawings, complete with shut-off valves (inlet and outlet of assembly), valve bypass, pressure gauges, strainers and pressure relief valves.
- E. **Traps, Strainers and Tailpieces:** Every sanitary fixture, unless otherwise specified, shall be provided with a seventeen (17) gauge chromium tailpiece, a Los Angeles pattern chrome plated cast-brass trap and galvanized nipple trap arm and wall flanges. Trap arm shall be provided with chromium plated brass casing between the trap and wall flanges at each fixture. All sanitary waste system floor drains and floor sinks shall have cast iron "P" traps.
- F. **Cleanouts:** Shall be Jay R. Smith and Zurn.
 1. **General:** Provide cast-iron ferrule and countersunk brass clean-out plug with round cast iron access frame and heavy duty secured top cover.
 2. **Wall Cleanouts:** Jay R. Smith No. 4472 for steel pipe and Jay R. Smith No. 4532 for cast iron pipe.
 3. **Floor Cleanouts:** Jay R. Smith No. 4023 or 4028, bronze plug and non-skid nickel bronze top.
 4. **Cleanouts to Grade:** Jay R. Smith No. 4258 or Jay R. Smith No. 4253 with X-H bronze plug and X-X-H non-skid cover with lifting device set flush with surface for concrete areas. Asphalt or nonsurfaced areas shall be installed with ring of concrete poured around the bottom flange six inches (6") below surface. Use cast iron soil pipe on cleanout risers. For cleanouts in non-traffic areas, terminate cleanout plug in concrete yard box.
- G. **Access Panels:** Wall access panels shall be minimum 12" x 12" for concealed valves and other equipment unless otherwise specified or indicated. Ceiling access panels shall be 18" x 18" minimum. Access panels shall be located and positioned for ready access and service of equipment housed within. Where access panels are specified with keyed cylinder locks, all such locks shall be identically keyed.
 1. **Wall, Non-Fire Rated:** Elmdor/Stoneman DW-SS-AKL, drywall, stainless steel finish, allen key latch.
 2. **Ceiling, Non-fire Rated:** Elmdor/Stoneman DW, drywall, prime coated finish, screwdriver latch.
 3. **Wall, Fire Rated:** Elmdor/Stoneman FR-SS, fire rated, stainless steel finish,

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- return latch.
4. **Ceiling, Fire rated:** Elmdor/Stoneman FRC, Fire rated, prime coated finish, return latch.
- H. **Yard Boxes & Vaults:** For service shut-off valves on gas and domestic water; for pressure regulator assemblies and for cleanouts, shall be Brooks Products or Fraser Cement Products Co., rectangular concrete type with vandal-proof cast iron cover and name of service clearly marked on cover. Box shall be of size to permit full range of valve operation and to permit easy removal of valve assembly. Vaults shall be sectional type.
- I. **Roof Flashing:**
1. Sanitary vents thru roof and grease vents thru roof: Stoneman No. 1100-5, one (1) piece, seamless, four (4) pound, series with reinforcing steel boot counterflashed with cast iron flashing sleeve and equipped with vandal-proof hood for all vent piping. Seal joint between flashing and pipe with waterproofing compound per flashing manufacturer's recommendations.
 2. Water, gas, condensate drainage and other metallic piping thru roof: Stoneman No. 1100-4, one (1) piece, seamless, four (4) pound, series with reinforcing steel boot counterflashed with cast iron flashing sleeve. Seal joint between flashing and pipe with waterproofing compound per flashing manufacturer's recommendations
- J. **Escutcheons:** Shall be chrome plated cast brass with setscrew locking device.
- K. **Water Hammer Arresters:** Shall be sized per the manufacturer's recommendations. Install at all quick closing valves, clothes washers and dishwashers behind access panel.
- L. **Dielectric Union Isolators:** Connection between incompatible materials above grade and inside building shall be made with two (2) dielectric unions separated by a twelve inch (12") section of red brass pipe. Dielectric union isolator for connection piping or non-compatible materials shall be of standard commercial design with threaded connections.
- M. **Pipe Supports:** Unless otherwise indicated on the drawings, shall be as follows:
1. The Contractor shall furnish and install all miscellaneous iron work including angles, channels, etc., required to appropriately support the various piping systems. Hanger spacing and location shall conform to 2013 California Plumbing Code Table 313.1.
 2. All horizontal runs of piping within the building to be supported from the structural framing with steel rods and split ring hangers, B-Line, Grinnell Company, Tolco, or approved equal. Steel rods shall be secured to overhead framing with side beam connectors. Where necessary, install angle iron between framing to accommodate hanger rods. Where several pipes are running together, Unistrut, B-Line or Powerstrut channels with clamps may be used in lieu of individual pipe hangers, and supported from structure as herein specified. Submit test data for type of hanger supports to be provided. For support conditions other than specified herein, the Contractor shall submit method of support for approval prior to any installation.
 3. **Horizontal Piping Hangers and Supports:**
 - a. **General:** Provide factory fabricated horizontal hangers and supports

complying with one of the following MSS types listed to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper-piping systems.

- a. Adjustable Steel Clevis Hangers: (MSS Type 1.) B-Line B 3100
- b. Adjustable Swivel Pipe Rings: (MSS Type 5) B-Line B3690

4. Vertical-Piping Clamps:

- a. **General:** Provide factory fabricated vertical-piping clamps complying with the following types listed, to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.
- b. Two-Bolt Riser Clamps: (MSS Type 8) B-Line B3373

5. Hanger-Rod Attachments:

- a. **General:** Provide factory fabricated hanger-rod attachments B-Line, Tolco or approved equal, selected by Installer to suit horizontal-piping hangers and building attachments, in accordance with MSS SP-58 and manufacturer's published product information. Select size of hanger-rod attachment to suit hanger rods. Provide copper-plated hanger-rod attachments for copper-piping systems.
- b. Side beam eye socket, Tolco Fig. #57 for rod sizes 3/8" dia. and Tolco Fig. #25-30-251 for rod sizes 1/2" dia.

6. Building Attachments:

- a. **General:** Provide factory fabricated building attachments, selected by Installer to suit building structural framing conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods. Provide copper-plated building attachments for copper-piping systems.

7. Hanger Rods and Spacing shall conform to the following table:

<u>Pipe Sizes</u>	<u>Spacing</u>	<u>Rods</u>
2 Inch and Smaller	6 Feet	3/8 Inch
2-1/2 Inch to 3 Inch	8 Feet	1/2 Inch
4 Inch and larger	8 Feet	5/8 Inch

- 8. Hangers and Supports shall be adequate to maintain alignment and prevent sagging and shall be placed within 18 inches of joint. Support shall be provided at each horizontal branch connection.
- 9. Provide lateral bracing as manufactured by B-Line or approved equal for all piping to prevent swaying or movement in accordance with SMACNA "Guidelines for Seismic Restraints of Piping Systems". Piping smaller than

indicated in the guidelines shall be provided with bracing as specified for the smallest size indicated. The entire water distribution system shall be properly braced and will not move due to the action of quick closing of valves.

10. **Miscellaneous Supports, Wall Brackets, Etc.:** Provide where required in accordance with the best standard practices of the trade. Submit shop drawings for all fabricated supports.
11. **Isolators.** All piping which is not isolated from contact with the building by its insulation shall be installed with a manufactured type isolator. Isolators shall be B-Line vibra clamp and cushion, Super Strut, Stoneman "Trisolator", or approved equal. Piping shall be installed and supported in a manner to provide for expansion without strains. Guides shall be properly installed to ensure this requirement.
12. Shields:
 - a. **General:** Provide shields at piping hangers and supports, factory-fabricated, for all insulated piping as manufactured by Pipeshields Incorporated or approved equal. Size shields for exact fit to mate with pipe insulation.
 - b. **Protection Shields:** MSS Type 40; provide high density insert of same thickness of insulation or equal 100-psi average compressive strength, waterproofed calcium silicate, encased with a sheet metal shield. Insert and shield shall cover entire circumference of the pipe and shall be of length indicated by manufacturer for pipe size and thickness of insulation.

N. Insulation:

1. **Hot Water Pipe Insulation:** All hot water supply piping, except exposed connections to plumbing fixtures, flanges and unions shall be insulated with ASTM C547, Class I, "Johns-Manville" "Micro-Lock" 850-APT, Owens-Corning Fiberglass Corp., ASJ/SL-11 or approved equal, 1" thick for sizes up to 2" and 1-1/2" thick for sizes 2" and larger with "Johns-Manville" "Zeston" pre-formed insulation inserts for all fittings. Insulation at all fittings shall be equal in thickness to insulation for piping. Insulation shall have a flame spread of not more than 25 and a smoke density not exceeding 50 per 2013 CMC
 - a. Exposed insulated piping in occupied areas and exposed outside the building shall be covered with Johns-Manville" "Zeston" 30-mil thick white PVC jacketing material per ASTM D1784 with "Johns-Manville" "Zeston" pre-formed insulation inserts for all fittings. Insulation at all fittings shall be equal in thickness to insulation for piping. Jacketing shall comply with ASTM E84, and shall have a flame spread of not more than 25 and a smoke density not exceeding 50 per 2013 CMC
2. **Condensate Pipe Insulation:** All condensate piping within the building shall be insulated with "Imcoa" "Imcolock" 3/4" nominal wall thickness closed-cell insulation. Insulation shall have a flame spread of not more than 25 and a smoke density not exceeding 50 per 2013 CMC. All joints shall be mitered and secured with black duct tape.
3. **Indirect Waste Pipe Insulation:** All indirect waste drains from refrigerated kitchen equipment shall be insulated with "Armacell" "Armaflex" insulating tape.

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4. All insulation shall be continuous through supports and hangers.
 5. All fixtures complying with the provisions of the Americans with Disabilities Act shall be provided with Prowrap insulation for exposed hot water pipe, tailpiece, and trap as manufactured by Mc
 6. Guire, and secured per manufacturers recommendations. No tape wrapping shall be permitted.
- O. Equipment and Fixtures:
1. Fixtures:
 - a. See schedule on drawings.
 - b. Accessible plumbing fixtures shall comply with all of the requirements of CBC Section 1115B. Heights and location of all fixtures shall be in according to CBC Section 1115B.4 and Table 1115B-1. Fixture controls shall comply with CBC Section 1115B.4.4.4 for showers, 1115B.4.3.1 for lavatories, 1115B.4.1.5 for toilets and 1115B.4.2.3 for urinals. Sinks shall not exceed 6-1/2" in depth, CBC Section 1115B.4.7.1.
 2. Acceptable Manufacturers.
 - a. The following manufacturers (or equal) shall be accepted for submittal review provided that all features and options are equivalent to the corresponding items as specified on plans and in specifications:
 - a. Vitreous China Plumbing Fixtures.
 - a) American Standard.
 - b) Kohler.
 - b. Flushometer Valves.
 - a) Sloan.
 - c. Toilet Seats.
 - a) Bemis.
 - b) Olsonite.
 - d. Wall-Hung Water Closet Carriers.
 - a) Zurn.
 - e. Stainless Steel Sinks.
 - a) Elkay.
 - b) Just.
 - f. Faucets.
 - a) Chicago.
 - g. Lavatory and Sink Drains.
 - a) McGuire.
 - b) Elkay.
 - h. Angle Stops / Supplies.

- a) Chicago.
- i. Enameled Cast Iron Service Sinks.
 - a) Ceco.
- j. Trap Primers.
 - a) Mifab.
 - b) Precision Plumbing Products.
- k. Water Hammer Arrestors.
 - a) Zurn.
 - b) Precision Plumbing Products.
- l. Floor Drains and Area Drains.
 - a) Zurn.
 - b) Jay. R. Smith.
- m. Roof Drains and Overflow Drains.
 - a) Zurn
 - b) Jay R. Smith.
- n. Floor Sinks.
 - a) Zurn.
- o. Electrical Water Coolers.
 - a) Haws.
 - b) Elkay.
- p. Thermal Expansion Tanks.
 - a) Wilkins.
 - b) Watts.
 - c) Amtrol.
- q. Hose Bibbs.
 - a) Acorn.
 - b) Woodford.
- r. Recessed Hose Bibbs.
 - a) Acorn.
- s. Electric Storage Tank Type Water Heaters.
 - a) Bradford White.
 - b) AO Smith.
 - c) American.
- t. Thermostatic Mixing Valves.
 - a) Symmons.
 - b) Bradley.

c) Leonard.

3. Furnish complete with necessary trim, including stops. All trim and fittings shall be chrome-plated brass including handles, supply tailpieces, traps and escutcheons.
4. Connections to fixtures shall be in accordance with code requirements except as exceeded herein or on the drawings and in no case less than the supply stop size.
5. All plumbing fixture faucets submitted for review shall have identification label or certification showing compliance with California TITLE 24, PART 5, ARTICLE 1, "Energy Conservation Standards". ARTICLE 1, T20-1406; ARTICLE 2, T20-1525 and ARTICLE 4, 1604 and 1606.
6. Minimum waste sizes shall be four-inch (4") for water closets and two inch (2") for lavatories.

P. Water Heaters (See Equipment Schedule on Drawings):

1. Electric Storage Tank Type Water Heaters:
 - a. Electric water heater shall be a glass-lined commercial electric model of the size and capacity as indicated on the drawings and as manufactured by Rheem, Bradford White, or American. Heater shall be constructed in accordance with ASME code for 160 psi working pressure and shall bear appropriate symbol and listed with the National Board as required. Heater shall be listed with Underwriters' Laboratories and approved by National Sanitation Foundation. All internal surfaces of the heater exposed to water shall be glass-lined. Tank shall be cathodically protected with adequate extruded magnesium rod. The entire vessel is to be enclosed in a round steel enclosure with baked enamel finish. Control compartment to be hinged and shall house 120 volt control circuit transformer, transformer fusing, magnetic contactor, immersion style operating thermostat, element fusing per N.E.C., and commercial grade incoloy sheathed flange mounted elements with prewired terminal leads. All factory wired temperature controls shall include high temperature cut-off for each element, high and low pressure switches, indicating pilot lights, switch with manual reset. Foam insulation, (R-16), shall exceed latest requirements of ASHRAE 90.1b-1990 for heat loss efficiency. Heater shall include ASME T & P relief valve and drain valve.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

- A. Locations and Accessibility: Install equipment for ease of maintenance and repair. If changes in the indicated locations or arrangements are made by the Contractor, they shall be made without additional charges.
- B. **Openings:** Furnish information to the other trades on size and location of openings which are required in walls, slabs, roof, for piping and equipment at the proper times.
- C. **Closing-In of Uninspected Work:** Do not allow or cause any of the work to be covered up or enclosed until it has been inspected, tested, and approved by the Architect. Any work enclosed or covered prior to such inspection and test shall be uncovered and, after it has been inspected, tested, and approved, make all repairs with such materials as may be necessary to restore all work, including that of other

trades, to its original and proper condition.

- D. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact locations and depth of existing utility and service lines to which he is going to connect. In event depth of existing sewer main or storm drain is not sufficient to permit installation of piping as detailed on drawings or to make connection in manner indicated, Contractor shall confer with the Architect, Owner's representative and Engineer for Direction.
- E. **Excavation, Trenching and Backfill:** Perform all necessary trench excavation, shoring, backfilling and compaction required for the proper laying of the pipe lines.
1. The Contractor shall coordinate the layout of all below grade piping and components with the General Contractor prior to bid to determine the extent of required sawcutting, excavation, alterations, and subsequent repair/restoration of all affected hardscape and softscape surfaces. All such items shall be included in bid.
 2. Backfill shall be clean soil free from rocks and debris. Compact to ninety percent (90%) of surrounding soil. All piping shall be installed in a minimum 6" sand bed and covered with 6" of sand prior to backfill. Continue backfill with materials free of rocks and debris, properly moistened and mechanically tapered and compacted to 90% of surrounding soil.
 3. Water, soil and waste piping shall have twenty-four (24") of cover minimum, except all PVC pipe material and all gas piping shall have eighteen (18") of cover minimum. All other pipe shall have not less than eighteen inches (18") of cover, unless otherwise noted on the drawings. Offset gas and water piping as required to permit crossover of underground piping systems, and electrical conduit systems.
 4. **Bottoms of Trenches:** Cut to grade and excavate bell holes to ensure the pipes bearing for their entire length upon the outside periphery of the lower third of the pipe.
 5. Water piping shall not be run in the same trench with sewer or drainage piping unless separated as required by the CPC.
 6. All horizontal soil and waste piping 3" and smaller shall be installed to a uniform grade of not less than one-fourth inch (1/4") per foot. All horizontal soil and waste piping 4" and larger shall be installed to a uniform grade of not less than one-eighth inch (1/8") per foot, unless otherwise indicated or directed.
- F. **Piping Installation:**
1. All piping shall be concealed in finished portion of the building except where otherwise indicated or directed at the time the work is done. All piping shall be installed to clear all framing members and beams, even if drawings do not indicate same. Contractor shall constantly check the work of other trades so as to prevent any interference with the installation of this work.
 2. All piping into stem walls and footings shall be double half lap wrapped with 1/8" thick "Armaflex" insulation. The Contractor shall also provide blocked out areas in stem wall and footing as required for the installation of the piping. All piping shall avoid the lower 9" of the footing and the Contractor shall coordinate and provide dropped footings as required for the installation of the underground piping.
 3. Unions shall be installed on one side of all screwed shut-off valves, at both

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- sides of screwed automatic valves and on all by-passes, at all equipment connections and elsewhere as indicated or required for ease of installation and dismantling.
4. Connections between copper tubing and equipment shall be with Mueller Brass Company, or approved equal, brass stream line copper to P.P.S. ground joint unions.
 5. Hot and cold water supplies to lavatories and sinks shall be provided with ninety degree (90°) drop-ear copper to pipe thread elbows. Cold water supplies to water closets and urinals shall be provided with ninety degree (90°) drop-ear copper to pipe thread elbows. Bolt securely to backing plates located between wall studs to provide a rigid anchor for exposed supply pipes and stops.
 6. Corrosion Protection:
 - a. General.
 - 1) Corrosion protection shall be provided for all below grade cast iron and copper piping and associated valves and fittings. Such piping shall be protected from corrosion by encasement in a polyethylene protective wrapping, referred to hereafter as polywrap. Although not intended to be a completely air and water tight enclosure, the polywrap shall provide a continuous barrier between the pipe and surrounding bedding and backfill.
 - b. Materials.
 - 1) Cast iron piping encasement.
 - a) The polywrap shall be minimum 8 mil. in thickness, group 2, linear low density, flat tube, natural (clear) virgin polyethylene film formed into tubes or sheets as required. Material shall meet or exceed the requirements of AWWA C105, ANSI A21.5 and ASTM A674.
 - b) The polywrap shall be as manufactured by Northtown Company or approved equal.
 - 2) Copper piping encasement.
 - a) The polywrap shall be minimum 6 mil. in thickness, group 2, linear low density, flat tube, natural (clear) virgin polyethylene film formed into tubes or sheets as required. Material shall conform to the requirements of ASTM D1248.
 - b) The polywrap shall be as manufactured by Northtown Company or approved equal.
 - 3) The minimum Polywrap flat tube width for each pipe diameter shall be as follows:

<u>Pipe Size / Type</u>	<u>Polywrap Flat Tube Width</u>
1/2" to 3/4" copper	2"
1" to 1-1/2" copper	3"
2" copper	4"

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- | | | |
|--|--------------------|-----|
| | 2-1/2" copper | 5" |
| | 3" copper | 6" |
| | 2" to 3" cast iron | 14" |
| | 4" cast iron | 16" |
- 4) The polywrap shall be secured as specified with 2 inch wide pressure sensitive plastic tape not less than 10 mils thick.
- a) Tape shall be Scotchwrap No. 50, Polyken No. 900, Tapecoat CT, Johns-Manville No. V-10 Trantex or approved equal.
- c. Installation.
- 1) The polyethylene tubing shall be cut into lengths approximately 2 feet longer than the pipe sections. Slip the tube around the pipe, centering it to provide a 1-ft overlap on each adjacent pipe section, and bunching it accordion fashion lengthwise until it clears the pipe ends. Lower the pipe into the trench and make up the pipe joint with the preceding section of pipe. A shallow bell hole must be made at each joint to facilitate installation of the polywrap. The bunched-up polywrap shall be pulled from the preceding length of pipe, slipped over the end of the new length of pipe, and secured in place with one circumferential turn of tape plus enough overlap to assure firm adhesion. The end of the polywrap shall be slipped from the new pipe section over the end of the first wrap until it overlaps the joint at the end of the preceding length of pipe and tape it in place. The loose wrapping on the barrel of the pipe shall be pulled snugly around the barrel of the pipe and excess material folded over the top of the pipe and the folds held in place by means of short strips of adhesive tape, at about 3 foot intervals along the pipe.
- 2) Rips, punctures or other damage to the tube shall be repaired with the adhesive tape or pieces of tube material secured with tape. Bends and reducers in the line shall be covered with polyethylene in the same manner as pipe.
- 3) Valves, tees, crosses and outlets shall be wrapped with flat sheets of the same material. The sheets shall be passed under valves and brought up around the body to the stem. Edges shall be brought together, folded twice and secured with the adhesive tape.
- G. Sleeves: Shall be plastic or galvanized steel where pipes pass through concrete walls or floor slabs.
1. Isolate pipes through ground floor slabs with Kraft paper, plastic tape or similar materials unless conduit is specified or indicated.
2. Sleeves for pipes through exterior walls shall be non-metallic with minimum 2" weep ring as manufactured by Link Seal. Pipe shall be sealed with Link Seal modular seal with EPDM seal elements.
3. Sleeves in or through fire rated walls shall be per U.L. Fire Resistance System No. WL1146 for drywall construction, and U.L. Fire Resistance System No. CAJ1044 for concrete construction. See architectural plans for

all locations of rated walls.

- H. **Contraction and Expansion:** Install all work in such a manner that its contraction and expansion will not do any damage to the pipes, the connected equipment, or the building. Install offsets, swing joints, expansion joints, seismic joints, anchors, etc., as required to prevent excessive strains in the pipe work. All supports shall be installed to permit the materials to contract and expand freely without putting any strain or stress on any part of the system. Provide anchors as necessary.
- I. Pipe Joints and Connections:
 - 1. Copper Tubing and Brass Pipe with Threadless Fittings:
 - a. Solder joints for copper shall be made with 95/5 lead free solder in accordance with manufacturer's recommendations for the service intended.
 - b. Use threaded adapters on copper tubing where threaded connections are required.
 - 2. **Welded Joints:** All welding to be performed by welders certified as passing ASME Boiler and Pressure Code (Section IX) and shall comply with ANSI Std. B31.1.0 and the American Welding Society, Welding Handbook.
- J. All closet bends shall be adequately blocked and secured. Trap arms and similar connections installed below the floor level or under concrete slabs shall be adequately supported and anchored to prevent motion in any direction. All piping installed above grade within buildings shall be secured to structural framing with Unistrut or pipe clamps to provide a rigid installation. Piping utilizing gaskets as a seal shall be given prime consideration to providing adequate stability through proper supports and anchors because of its flexible nature.
- K. Flexible piping of any kind will not be permitted except when indicated on drawings. Provide Hose Master Inc., flexible pipe appliance connector model UNP, female union, male nipple and plastic cover, AGA approved for kitchen equipment only.
- L. Each pipe penetration of the roof shall be separated from other piping and any roof equipment by a minimum of 18" to insure a proper pipe flashing installation.
- M. **Floor, Wall and Ceiling Plates:** Where pipes pierce finished surfaces, C.P. brass split flanges with setscrew lock shall be provided.
- N. **Roof Flashings:** Extend pipe a minimum of seven inches (7") above finished roof line, except where a vandal proof hood is required in which case pipe shall extend to a height required to receive the hood and also where specifically required to exceed this dimension by the local authority due to snow conditions.
- O. Installation of Plumbing Fixtures:
 - 1. Install each fixture at the exact height and location shown on the Architectural Drawings.
 - 2. Set fixtures, supplies, trap and trap outlet square with the wall, in line with fixture outlets without any offsets, angles, or bends.
 - 3. Grout joint between the fixtures and the walls or floors with polysulfide or silicone sealant to be smooth, even and watertight.
- P. Completion of Installation:
 - 1. **Cleaning and Flushing:** Clean all equipment and materials thoroughly. Leave surface to be painted smooth and clean, ready for painting.

2. Flush each unit of water supply and distribution system thoroughly with clean water at the highest velocities attainable.
3. Clean all piping, valves, traps, water heaters, fixtures and other devices thoroughly and flush or blow out until free of scale, oil silt, sand, sediment, pipe dope and foreign matter of any kind.

3.02 STERILIZATION OF DOMESTIC WATER LINES

- A. Sterilize water lines by filling with a solution containing fifty (50) parts of chlorine per million parts water and holding the solution therein for at least eight (8) hours with a water head of at least five feet (5') above the highest point in the system. Unless otherwise directed, thoroughly flush each line prior to sterilization. Introduction of sterilizing solution or materials into the lines shall be such as to provide thorough and uniform distribution throughout the system.
 1. Operate all valves during the retention period. Following retention period, the heavy chlorinated water shall be flushed from the system with clean water.
 2. Continue flushing until the residual chlorine at the end of 24 hours is as required by AWWA C651.
 3. All work and certification of performance must be done by an approved laboratory utilizing qualified applications and personnel.
 - a. Upon completion of the domestic water line sterilization, Contractor shall submit sterilization report directly to the Architect stating that all testing was performed as specified and that testing was performed by an approved laboratory utilizing qualified applications and personnel.

3.03 TESTING

- A. No piping work shall be concealed or covered until piping has been tested, inspected and approved by the Inspector. All piping for plumbing systems shall be completely installed and tested as required by the Uniform Plumbing Code. Test pressures and times indicated are a minimum only. All tests shall be as required by the governing authority as well.

Schedule of Test Pressures:

<u>System Tested</u>	<u>Gauge</u>	<u>Test</u>	<u>Duration</u>
Water	100 PSI	Water	4 Hours

Waste, Vent and Storm Drain: Per California Plumbing Code (Minimum 10 Feet of Head)

3.04 OPERATION INSTRUCTION

- A. Prior to occupancy or prior to the date of final inspection, whichever may occur first, the Contractor shall prepare two (2) sets of typewritten instructions for the operation of all equipment, valves, etc., specified and furnished as a part of the work under this section, and shall assign a competent person, thoroughly familiar with the job, to demonstrate and instruct a representative of the Owner in the operation of the equipment. The time of said demonstration and instructions shall be arranged with the Owner's representative approximately one (1) week in advance. Verbal instructions shall include shut-off location of gas and water. The Contractor shall assemble all operation and maintenance data supplied by the manufacturers of the

various pieces of equipment, all keys and special wrenches required to operate and service the equipment (including keys for yard boxes, gas stops and fixture stops), and all equipment warranties and deliver same to the representative of the Owner on date of said instructions.

3.05 PIPE AND EQUIPMENT IDENTIFICATION

- A. Each operating and service line shut-off valve shall be identified by a 19 ga. brass tag with stamped, engraved type of service identified and area served, complete with hole and brass chain mounted on valve stem or handle. Tag shall be a minimum of one and one-half inch (1-1/2") in diameter.
- B. All piping systems shall be readily identifiable by appropriate labeling with the name of the piping contained. Such labeling shall be by means of metal tags, stenciling, stamping, or with adhesive markers, in a manner that is not readily removable. Labeling shall appear on the piping at intervals of not more than 20 ft and at least once in each room and each story traversed by the piping system.
- C. All equipment shall be provided with name plate indicating all pertinent information on it.

END OF SECTION

Additional Instructions for Signage Contractors interested in Bidding on the Project other than the three companies previously approved and listed in Section 1.01 of the General Requirements and Specifications for the Anthony Munoz Community Center Gymnasium Signage Program:

As per the Signage and Graphics General Requirements and Specifications, any Sign Contractors interested in bidding on this project must submit their company history and information consistent with Section 1.02 E for review and approval by the City and Architect prior to the Bid Date. The photographic documentation of at least three completed projects will need to illustrate the capability of producing signage for projects of similar size, scope, components, materials and fabrication techniques required to complete the scope of work in the Signage Program detailed for this project. All required vendor bid documentation must be submitted and received on or before September 14, 2026 at 5:00pm. A list of those companies that have been approved to bid will be posted within the Q&A response no later than September 16, 2026.