



**SECTION F**  
**TECHNICAL SPECIFICATIONS**

**CSA 70M WONDER VALLEY  
COMMUNITY CENTER  
KITCHEN AND RESTROOM  
REMODEL PROJECTS**

**FOR**

**COUNTY SERVICE AREA 70M WONDER VALLEY  
TWENTYNINE PALMS, CALIFORNIA**

SAN BERNARDINO COUNTY

SAN BERNARDINO,  
CALIFORNIA

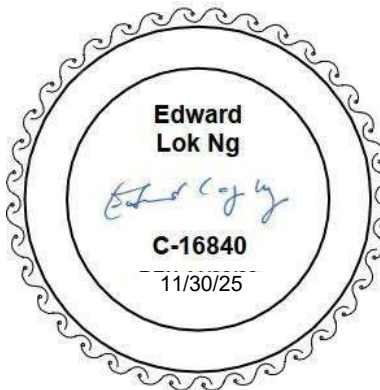
PROJECT SPECIFICATIONS  
FOR  
**CSA 70M WONDER VALLEY COMMUNITY CENTER  
KITCHEN AND RESTROOM REMODEL PROJECT**

PROJECT NO.: 30.30.0149

SPECIAL DISTRICTS DEPARTMENT

March 2024

Prepared by:  
BOA ARCHITECTURE  
1511 Cota Avenue,  
Long Beach, California 90813  
562/912-7900



**DOCUMENT 00 0102  
PROJECT DIRECTORY**

Title: CSA 70M Wonder Valley Community Center  
Kitchen and Restroom Remodel Project

Client Agency: San Bernardino County Special Districts Department  
222 W Hospitality Ln Second Floor,  
San Bernardino, CA 92415  
Contact: Alfonso Fausto

Project Location: Wonder Valley Community Center  
80526-1/2. Amboy Rd.  
Twentynine Palms, CA 92277

Architect: Edward Lok Ng, Architect  
BOA Architecture  
1511 Cota Avenue  
Long Beach, CA 90813  
Tel: 562-912-7900

NOT FOR BID

**SAN BERNARDINO COUNTY 00 0102**

**WONDER VALLEY COMMUNITY CENTER  
RENOVATION**

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**INTRODUCTORY INFORMATION**

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REQUIREMENTS: *Issued separately by the County*

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Section 02 4119 Selective Structure Demolition  
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**DIVISION 6 – WOOD, PLASTICS, AND COMPOSITES**

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**APPENDIX**

A Pure Aqua Reverse Osmosis System Drawings

END OF DOCUMENT

**NOT FOR BID**

**SECTION 01 1000  
SUMMARY OF WORK**

GENERAL

1.1 SCOPE

- A. The Contractor shall provide all materials, labor, tools, plant, supplies, equipment, transportation, superintendence, temporary construction of every nature, and all other services and facilities necessary to complete the construction of the kitchen and restroom facilities, including all incidental work described in the contract documents.
- B. The scope of work is contained in the contract documents.
- C. The scope of work includes, but is not limited to the following:
  - 1. **Interior Scope:** Renovation of existing community center to provide accessible compliance and renovation at existing restroom area and kitchen. Restrooms shall have new urinal, toilets, sinks and accessories. The kitchen shall have a replaced counter, shelving units, and sinks. There will be new flooring, lighting, wainscot, cove base and exhaust fans. Accessible compliance scope shall include relocating existing toilet partitions, new automatic door opener.
  - 2. **Exterior Scope:** Replace existing roof mounted range hood exhaust fan. Provide a new underground grease interceptor. Provide a new equipment pad and equipment enclosure metal building for new reverse osmosis water system.
- D. All work shall be in accordance with applicable codes and local regulations that may apply. In case of conflict in or between the Contract Documents and a governing code or ordinance, the more stringent standard as determined by the Engineer shall apply.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION

**SECTION 01 3300  
SUBMITTAL PROCEDURES**

**PART 1 - GENERAL**

**1.1 Schedule of Submittals**

- A. After receiving a Notice to Proceed, the Contractor must submit a Schedule of Submittals, in the format indicated below, in duplicate, listing all items that must be furnished for review and approval by the Engineer. The schedule must indicate the type of items (such as samples, shop drawings, catalog cut, and so forth) and include the scheduled dates of submittal. In preparing the schedule, adequate time (10 days or more exclusive of time in the mail) must be allowed for review and approval and possible resubmittal. Also, the schedule must be coordinated with the approved construction progress chart. The Contractor must revise and/or update the schedule monthly. Such revised schedules must be submitted to the Engineer for approval. Refer to County General Conditions for all durations of time to complete tasks.
- B. During bidding and after receiving a Notice to Proceed, the Contractor must complete and submit to the Engineer a listing of all subcontractors, including subcontractor name, address, telephone number, fax number and email address. Include an updated list with each progress payment request. Refer to County General Conditions for all durations of time to complete tasks.
- C. Schedule of Submittals Format

Project \_\_\_\_\_

Contract No. \_\_\_\_\_

Project Description \_\_\_\_\_

Spec. Section	Spec. Description	Paragraph Number	*Submittal Type	Date		Action Taken	Assigned Number
				Submittal	Returned		

\*Submittal Type:

C – Certificate

S – Sample

SD – Shop Drawing

CD – Catalog Data

PL – Spare Parts List

MM – Maintenance Manual

**1.2 Shop Drawings and Related Data**

- A. Prior to submittal, the Contractor must stamp and sign the submittal to indicate that it is in accordance with the contract documents without deviation and has

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been reviewed and approved by the Contractor. The Contractor must make any

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corrections required by the Engineer. If the Contractor considers any correction indicated on the drawings to constitute a change to the contract drawings or specifications, notice must be given to the Engineer. Four prints of all approved shop drawings must be given to the Engineer. The approval of the drawings by the Engineer must not be construed as a complete check but indicates only that the submittal appears to comply with the contract documents. Approval of the shop drawings does not relieve the Contractor of responsibility for any error that may exist because the Contractor is responsible for the dimensions and for satisfactory construction of all work. The submission by the Contractor must be accompanied by a transmittal letter in a format approved by the Engineer.

1.3 Material, Equipment, and Fixture Lists

- A. When required by the technical provisions, lists of materials, equipment, and fixtures must be submitted by the Contractor in accordance with the requirements specified for shop drawings. The lists must be supported by sufficient descriptive material, such as catalogs, cuts, diagrams, and other data published by the manufacturer, as well as by evidence of compliance with safety and performance standards, to demonstrate conformance to the specification requirements. Catalog numbers alone are not acceptable. The data must include the name and address of the nearest service and maintenance organization that regularly stocks repair parts. No consideration will be given to partial lists submitted from time to time. Approval of materials and equipment is tentative, subject to submission of complete shop drawings indicating compliance with the contract documents.

1.4 Certificates of Compliance

- A. Any certificates required for demonstrating proof of compliance of materials with specification requirements, including statements of application, and extended guarantees, must be signed and submitted in quadruplicate to the Engineer at least 10 days before delivery. The Contractor must review all certificates before submissions are made to the Engineer, to ensure compliance with the contract specification requirements and to ensure that the affidavit is properly signed. Each certificate must be signed by an official authorized to certify on behalf of the manufacturing company and must contain the name and address of the Contractor, the project name and location, and the quantity and date or dates of shipment or delivery to which the certificates apply. Copies of laboratory test reports submitted with certificates must contain the name and address of the testing laboratory and the dates of tests to which the report applies. Certification must not be construed as relieving the Contractor from furnishing satisfactory material if, after tests are performed on selected samples, the material is found not to meet the specific requirements.

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SUBMITTAL PROCEDURES**

1.5 Review of Submittals

- A. When submittals are reviewed by others, each submittal must be returned to the Engineer stamped and signed or marked in one of the following ways:
  - 1. A Action: The Contractor is advised that "A Action" means that fabrication, manufacture, or construction may proceed, provided the work complies with the contract documents.
  - 2. B Action: The Contractor is advised that "B Action" means that fabrication, manufacture, or construction may proceed, provided the work complies with the notations and the contract documents.
  - 3. C Action: The Contractor is advised that "C Action" means that no work may be fabricated, manufactured, or constructed and that the Contractor must make a new submittal. Any submission marked "C Action" is not permitted on the site.
- B. The "A Action" or "B Action" submittals must be returned to the Engineer. The Contractor is responsible for obtaining prints of them and for distributing them to the field and to subcontractors.
- C. In the case of shop drawings in the form of manufacturers' descriptive literature, catalog cuts, and brochures stamped "A Action" or "B Action," returned to the Engineer, the Contractor is responsible for distributing them to the field and to the subcontractors. If the shop drawings are stamped "C Action," the Engineer will provide copies to the Contractor, who must submit new shop drawings to the Engineer.
- D. In the case of samples stamped "A Action" or "B Action," the Engineer will provide one of the samples to the Contractor. In the case of samples stamped "C Action," all the submitted samples must be returned.

1.6 Spare Parts Data

- A. Spare parts data must be submitted in quadruplicate.

1.7 Schedule of Values

- A. The Contractor must submit a construction cost breakdown using the County provided Schedule of Values. When applicable, a separate cost breakdown form must be submitted for each separate building. However, the total cost of site work for each facility must be included in the cost estimate breakdown for each restroom building and exterior work. The number of items provided on the Systems Construction Cost Estimate Breakdown form are the minimum required. The Contractor may use additional subdivision of these items if needed.
- B. Submit the construction cost breakdown after contract award to the Engineer.

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SUBMITTAL PROCEDURES**

- C. Do not delete items from the Schedule of Values form. However, expand the schedule "Description of Work" as necessary to allow evaluation of work or to make progress payments.
- D. If the contract price changes, the Schedule of Values must be revised to reflect the change(s) and forwarded to the Engineer.
- E. A current Schedule of Values must accompany all Contractor Requests for Payment. Refer to County General Conditions
- F. See following exhibit for Schedule of Values.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION

**SECTION 013543  
ENVIRONMENTAL PROCEDURES**

**PART 1 - GENERAL**

**1.1 Scope**

- A. The work covered by this section consists of furnishing all labor, material, and equipment and performing all work required for compliance with environmental regulations and preventing pollution during, and because of, construction operations under this contract, in addition to those measures set forth in other technical provisions of these specifications.
- B. The Contractor and subcontractors must comply with all applicable environmental federal, state, local environmental, health and safety laws and regulations.

**1.2 Notification**

- A. The Contractor must, after receiving a notice of noncompliance with the foregoing provisions, immediately take corrective action. The notice, when delivered to its Contractor or its authorized representative at the site of the work, is deemed sufficient for this purpose. If the Contractor fails or refuses to comply promptly, the Engineer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost because of any such stop orders may be made the subject of a claim for extension of time or for excess costs or damages by the Contractor unless it is subsequently determined that the Contractor was in compliance.

**1.3 Environmental Regulatory Compliance**

- A. Within 30 days after receiving the notice to proceed or not less than 15 days prior to commencing on-site work, the Contractor must submit any environmental documents that are required by federal, state, or local environmental regulations. The Engineer must approve the Plans prior to commencing on-site work and must describe and include, but is not limited to, the following
  - 1. Waste Minimization and Management Plan must describe how natural resources potentially impacted by construction will be protected or managed; construction wastes will be stored and disposed of or recycled; and pollutants associated with building materials will be controlled. The waste minimization and management section of the plan must also list materials and construction debris to be recycled and address the disposal of solid and hazardous wastes and materials, including asbestos and lead-based paint. It must also include tables applicable to the reclamation of chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) in accordance with the County recycling code and 1.4 (B) below.

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2. Environmental Compliance Plan must document NEPA compliance by describing mitigation measures to address environmental concerns/sensitive receptors identified in the National Environmental Policy Act (NEPA) document(s) in Section B. 1500, Attachments, and as set out in the mitigation measures in the General Requirements.

1.4 Environmental Site Controls

- A. Location of Hazardous Materials: The location of the Contractor's temporary storage of any hazardous materials and/or wastes must be appropriately marked and included in the health and Safety Plan (see Section 1.5 below).
- B. Post Construction Cleanup or Obliteration: The Contractor must remove and properly dispose of all signs of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, excess or waste materials, or any other vestiges of construction as directed by the Engineer. No separate or direct payment may be made for post construction cleanup and all associated costs must be considered included in the contract price.
- C. Dust Control: The Contractor must keep the site free from dust in accordance with applicable regulations.
- D. Noise Minimization: The Contractor must perform demolition and construction operations to minimize noise, including conducting work during less sensitive hours of the day in accordance with the County's Noise Ordinance.

1.5 Health and Safety

- A. Prior to commencing on-site work, the Contractor must submit an Occupational Safety and Health Administration (OSHA) Emergency Action Plan (EAP) to the Engineer to demonstrate compliance by the Contractor and subcontractors with applicable OSHA regulations. If the Contractor is not required by OSHA to develop a written EAP, i.e., if 10 or fewer are employed for the construction project or any other specific regulations identified by OSHA, then the Contractor shall submit to the Engineer a signed letter stating the Contractor shall meet OSHA's EAP requirements in a verbal communication to all employees.
- B. Copies of Material Safety Data Sheets (MSDSs) for any hazardous material(s), as defined by OSHA's Hazard Communications Standard, must be included whenever such materials arrive on-site. MSDSs must be kept together and maintained centrally on-site through to project completion. Provide a copy of each MSDS in the Operating and Maintenance Manual. The use of asbestos containing materials, more than one percent as defined by US Environmental Protection Agency regulations, is prohibited in the construction of this project.

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ENVIRONMENTAL PROCEDURES**

Provide an executed copy of the "Certificate of Asbestos and Lead-Based Paint (New Work)" in the Operating and Maintenance Manual.

- C. The use of lead-based paint is prohibited in the construction of this project.
- D. The use of lead-containing solder for plumbing and plumbing fixtures is prohibited in the construction of this project.
- E. The Contractor must sign and submit to the Engineer a "Certification of Asbestos and Lead-Based Paint" for this project.
- F. See following exhibits for additional information.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION

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**Safety and Health and Related Environmental Requirements**

The Contractor is required to meet all applicable OSHA, federal, state, and local safety, health, and related environmental requirements in addition to the County requirement listed in this table.	
<b>Issue</b>	<b>County Requirements</b>
<b>Asbestos</b>	<p><i>Review of Facility Asbestos Survey:</i> Before any building maintenance, equipment installation, renovation, alteration, demolition, or other project begins, determine whether ACBM will be disturbed.</p> <p>Proper Work Practices: If ACBM is present, follow proper control procedures and work practices.</p> <p><i>Consultation With Facility Asbestos Coordinator:</i> Consult with the facility manager or his or her designee before the start of any work likely to disturb ACBM. Disturbance means activities that crumble or pulverize ACBM or presumed asbestos-containing material (PACM) or generate visible debris. Operations may include drilling, abrading, cutting a hole, pulling cable, and crawling through tunnels or attics and spaces above the ceiling where asbestos is actively disturbed or asbestos-containing debris is actively disturbed.</p> <p><i>Asbestos Work Authorization:</i> You must have an approved Form 8210, <i>Work Authorization - Asbestos</i>, before work begins within any building containing asbestos.</p>
<b>Barricades, Barriers, and Warnings</b>	Your barricades must meet the OSHA requirements. In addition, you assume control of your work area during your activities unless otherwise specified in writing by the County Engineer (CE) or County Engineer's representative (CER).
<b>Confined Spaces</b>	<p>Confined space work must meet the OSHA requirements. You must have a comprehensive confined space program that includes a written program, employee training, entry and testing equipment, and rescue capabilities.</p> <p>If you require access to confined space requiring a permit, then the trained, designated County representative must review and approve the project and permit. Entry into other confined spaces must be in accordance with OSHA regulations.</p>
<b>Electrical Work</b>	Lock or rope off work areas involving exposed energized equipment or have an attendant present to prevent accidental contact by unqualified people. Refer to the Barricade section of this guideline for additional information.
<b>Elevated Work and Fall Protection</b>	Follow strictly the applicable OSHA fall protection requirements.
<b>Excavation</b>	<p>All excavations 4 feet or more in depth must be properly shored or sloped and meet all OSHA requirements.</p> <p>Before any digging or drilling commences, inform the County COR and call Dig Safe or its local equivalent to determine whether any underground utilities are in the work area. Submit documentation that these notifications have been performed. You must not begin digging or drilling until you have verified that underground utilities have been identified and are properly marked so that work may be accomplished in a safe manner.</p>
<b>Fire Protection</b>	<p>Do not block, remove, or otherwise prevent County fire extinguishers from being immediately accessible and usable.</p> <p>If a system must be impaired by a scheduled shutdown, notify the Engineer, and do not proceed without the Engineer's authorization.</p>
<b>Hazard Communication</b>	Inform the Engineer before any chemicals are used. Before materials are brought on site, provide material safety data sheets (MSDSs) and an

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	<p>inventory of materials. For projects that are anticipated to use substantial quantities of hazardous materials, you may be required to provide a routing, storage, and waste disposal plan.</p>
<b>Hazardous Materials</b>	<p>Follow all OSHA requirements regarding hazardous materials. Hazardous materials include, but are not limited to, flammable and combustible liquids, gasoline, diesel fuel, motor oil, lubricating oil, hydraulic oil, corrosive cleaners, and battery acid.</p> <p>Provide secondary containment for all containers of liquids that are over 5 gallons in capaCounty.</p> <p>Immediately report all hazardous material releases ("spills"), regardless of how small or where they occur, to the designated Engineer. Releases include solids, liquids, and gases.</p>
<b>Hot Work</b>	<p>Do not begin any hot work until the Engineer has completed and signed a County Hot Work Permit. The permit will be valid for only a single work shift. You must display the permit at the work site.</p> <p>You are prohibited from performing hot work (a) when the County has not authorized it, (b) in locations in which fire protection systems have been impaired, (c) in the presence of explosive or flammable atmospheres, or (d) in locations where large quantities of flammable and combustible materials are unprotected.</p>
<b>Powered Industrial Trucks</b>	<p>Powered industrial trucks and other mobile equipment must follow all traffic rules of the County facility. The maximum speed limit for in-plant powered vehicles is 5 miles per hour. Many work areas have posted speed limits that you must strictly follow. Perform refueling only in authorized locations following safe procedures.</p> <p>As a rule, the County does not allow gas- or diesel-powered industrial equipment inside County facilities. Coordinate exceptions to the rule through the County safety office.</p>
<b>Ladders</b>	<p>Strictly follow all OSHA requirements regarding ladders. Barricade the ladder use area to prevent contact with mobile equipment and employees.</p>
<b>Lead-Based Paint</b>	<p><i>Review of Facility Lead Survey:</i> Before any construction, alterations, and/or repair activities begin, determine whether LBP will be disturbed. If the painted surface has not been tested, you must have it tested before beginning any activities that could potentially disturb LBP.</p> <p><i>Proper Work Practices:</i> If LBP is present, follow proper control procedures and work practices.</p> <p><i>Consultation With Engineer:</i> Consult with the Engineer before the start of any work likely to disturb LBP. Examples of activities that may affect LBP include paint removal by scraping, sanding, power tools, or heat guns; alterations that include removing drywall, structural steel, or other building materials coated with LBP; welding, cutting, or other hot work on coated metal surfaces; abrasive blasting of mailboxes and other equipment; and moving or cleaning of abrasive blasting enclosures.</p>
<b>Lockout/Tagout</b>	<p>Provide a copy of your lockout/tagout procedures, which must meet or exceed the OSHA Lockout/Tagout standard. You will be given access to and must review the County lockout/tagout program.</p> <p>If you encounter a County lockout/tagout device that prevents the continuation of work, do not make any attempts to remove, tamper with, or bypass the devices. Contact the Engineer and make arrangements to have the lockout device removed in accordance with County lockout removal policies.</p>
<b>Personal Protective Equipment</b>	<p>Before beginning work, evaluate the work area for hazards, determine whether contract employees will be required to use personal protective</p>

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	<p>equipment (PPE) to protect themselves from these hazards, and document the hazard assessment. Wear the PPE required regardless of your perception of hazard potential.</p>
<b>Regulated And Prohibited Materials</b>	<p><i>Pesticides.</i> The County has restricted the use of pesticides. Obtain prior approval of the County environmental compliance coordinator for special cases that may require the use of pesticide treatments. <i>Seventeen Chemical Prohibition.</i> Adhere to chemical prohibition policies. Do not use on County property any of the 17 chemicals prohibited by EPA unless the Engineer authorizes its use (each of these chemicals must be authorized separately). The district environmental compliance coordinator can supply the list. <i>Asbestos-Free Products.</i> Install no asbestos-containing products or materials in County facilities. <i>Lead.</i> Apply no lead-based paint in County facilities.</p>
<b>Scaffolding</b>	<p>Follow strictly the applicable OSHA scaffolding requirements. Provide adequate barrier protection around the scaffolding to prevent hazards to County staff.</p>
<b>Walking and Working Surfaces</b>	<p>If the project requires temporary modifications to the means of egress, inform the Engineer before performing such actions, provide appropriate alternative means of egress, and communicate these to all employees.</p>

NOT FOR

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ENVIRONMENTAL PROCEDURES**

**Emergency Procedures**

<b>Preparations for Emergency</b>	<p>Be prepared for emergency situations.            Ensure that emergency telephone numbers are site specific, readily available, easily read, and communicated to all employees.            Train and authorize employees to implement emergency procedures.</p>
<b>Medical Emergencies</b>	<p>Have procedures and medical supplies to provide emergency medical services for your own personnel.            Determine how to contact emergency medical services before work begins and have on-site capabilities to contact such services immediately.</p>
<b>Fires</b>	<p>See Fire Protection above.            In the event of a fire, you must:            - Immediately remove personnel from the area or building following County evacuation procedures.            - Immediately contact the nearest County employee and inform him or her of the fire. You may also activate an emergency alarm in the area. If no County employees are on-site, immediately contact the local fire department.            Personnel trained in the use and limitations of fire extinguishers may attempt to extinguish the fire if it is safe to do so.</p>
<b>Chemical Releases</b>	<p>See Hazardous Materials above.            If the event of a hazardous material release, you must:            - Immediately remove personnel from the area or building following County evacuation procedures.            - Immediately contact the designated County representative and inform him or her of the release. You may also activate an emergency alarm in the area. If no County employees are on-site, immediately contact the local fire department.            Contractor personnel should not respond to the release unless specifically trained and protected to perform hazardous material response.</p>
<b>Power Outages</b>	<p>In the event of a power outage, you must:            - Immediately stop work and assemble for a head count and possible facility egress.            - Inform all contract employees that equipment may automatically restart when power resumes.            - Immediately contact the designated County representative and inform him or her of the status of contract work and personnel head count. Relay at this time all hazards created due to the power outage.            When power resumes evaluate the status of operations that were being performed relative to hazard potential. For example, the interruption of ventilation in confined spaces may generate atmospheric hazards.</p>
<b>Accident Investigation and Reporting</b>	<p>As soon as is practical after an accident, investigate and document an accident investigation. The documentation must describe the incident and identify the causes and the corrective actions that will prevent future incidents.            Report all accidents, whether or not they result in injury. Give the written report to the Engineer within 24 hours of the accident or incident.</p>

**CERTIFICATE OF ASBESTOS AND LEAD-BASED PAINT**

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(New Work)

To: County Engineer

Subject: Certification for new construction

County facility name: \_\_\_\_\_  
\_\_\_\_\_

County facility address: \_\_\_\_\_  
\_\_\_\_\_

**Certification for new construction:**

This Contractor/Owner hereby certifies that no asbestos-containing material more than 1 percent as defined by applicable US Environmental Protection Agency regulations, and no lead-based paint has been furnished or installed at the referenced project.

Contractor/Owner name: \_\_\_\_\_

Signature: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Telephone: \_\_\_\_\_ Date executed: \_\_\_\_\_

**SECTION 014000  
QUALITY REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 Contractor Quality Control**

- A. Contractor Quality Control: The Contractor is responsible for the overall quality of all its own work and the work performed by their subcontractors working under this contract. The quality of any part of the work installed must not be less than that required by the technical divisions of this specification. If the Engineer determines that the quality of work does not conform to the applicable specifications and drawings, the Contractor will be advised in writing of the areas of nonconformance, and within 7 days the Contractor must correct the deficiencies and advise the Engineer in writing of the corrective action taken.
- B. Noncompliance with Quality Control Requirements: Failure of the Contractor to comply with the above requirements may be cause for termination for default as defined in the contract documents.

**1.2 Submittals**

- A. Prior to the start of on-site work, the Contractor must submit to the Engineer a Contractor Quality Control Plan that includes the following information:
  - 1. Procedures for reviewing coordination drawings, shop drawings, certificates, certifications, or other submittals.
  - 2. Testing and inspection schedule, keyed to Construction Schedule, indicating tests and inspections to be performed, names of persons responsible for inspection and testing for each segment of work including preparatory, initial, and follow-up.
  - 3. Proposed forms to be used including Contractor's Daily Report, Contractor Test and Inspection Report and Non-Compliance Check-Off List.

**1.3 Quality Control Procedures**

- A. Monitor quality control over Contractor staff, subcontractors, suppliers, manufacturer's, products, services, site conditions, and workmanship.
- B. Comply fully with manufacturer's published instructions, including each step-in sequence of installation.
- C. Should manufacturer's published instructions conflict with Contract Documents, request clarification from the Engineer before proceeding.
- D. Comply with specified standards as a minimum quality for work, except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

**SECTION 014000**  
**QUALITY REQUIREMENTS**

- E. Perform work by persons who are thoroughly qualified and trained in their respective trade, to produce workmanship of specified quality.
- F. Perform tests required by governing authorities having jurisdiction and utilities having jurisdiction.

1.4 Testing and Inspection Laboratory Services

- A. Selection and Payment:
  - 1. The County shall select and pay for the services of an Independent Testing and Inspection Laboratory to perform specified testing and inspection.
  - 2. Employment of Independent Testing and Inspection Laboratory in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.
- B. Quality Assurance:
  - 1. Comply with requirements of all applicable ASTM standards.
  - 2. Laboratory: Authorized to operate in the State in which Project is located.
  - 3. Laboratory Staff: Maintain a full-time registered engineer on staff to review services.
  - 4. Testing Equipment: Calibrated at reasonable intervals with devices of and accuracy traceable to either National Bureau of Standards or accepted values of natural physical constraints.
- C. Laboratory Responsibilities. Contractor shall ensure the Laboratory has the following responsibilities and limits on authority:
  - 1. Test samples of mixes submitted by Contractor.
  - 2. Provide qualified personnel at the Project site. Cooperate with the Engineer and Contractor in performance of services.
  - 3. Perform specified sampling, testing, and inspection of Products in accordance with specified standards.
  - 4. Determine compliance of materials and mixes with requirements of Contract Documents.
  - 5. Promptly notify the Engineer of observed irregularities or non-conformance of work or Products.
  - 6. Submit one copy of all test results directly to the Engineer.
  - 7. Perform additional tests as required by the Engineer.
  - 8. Attend appropriate preconstruction meetings and progress meetings.
- D. Limits on Authority. Contractor shall ensure the Laboratory has the following limits on authority:
  - 1. Laboratory may not release, revoke, alter, or expand on requirements of Contract Documents.
  - 2. Laboratory may not approve or accept any portion of work.
  - 3. Laboratory may not assume any duties of Contractors.
  - 4. Laboratory has no authority to stop work.

**SECTION 014000**  
**QUALITY REQUIREMENTS**

1.5 Contractor Field Inspection and Testing

- A. Contractor: Test and Inspect work provided under this Contract to ensure work is in compliance with Contract requirements. Required tests and inspections are indicated in each individual Specification Section and shall be performed as required by the County inspector.
- B. Preparatory Inspection: Performed prior to beginning work and prior to beginning each segment of work and includes:
  - 1. Review of Contract requirements.
  - 2. Review of shop drawings and other submittal data after return and approval.
  - 3. Examination to assure materials and equipment conform to Contract requirements.
  - 4. Examination to assure required preliminary or preparatory work is complete.
- C. Initial Inspection: Performed when representative portion of each segment of work is completed and includes:
  - 1. Performance of required tests.
  - 2. Quality of workmanship.
  - 3. Review for omissions or dimensional errors.
  - 4. Examination of products used, connections and supports.
  - 5. Approval or rejection of inspected segment of work.
- D. Follow-Up Inspections: Performed daily, and more frequently as necessary, to assure non-complying work has been corrected.
- E. Testing and Inspection: Perform testing and inspection in accordance with requirements in individual Specification Sections.

1.6 Contractor's Daily Report

- A. The Contractor shall maintain daily reports, and provide copies to the Engineer if requested, for days that work was performed. Include the following information:
  - 1. Date, weather, minimum and maximum temperatures, rainfall, and other pertinent weather occurrences.
  - 2. Daily workforce of Contractor and subcontractors, by trades.
  - 3. Description of work started, ongoing work, and work completed by each subcontractor.
  - 4. Coordination implemented between various trades.
  - 5. Approval of substrates received from various trades.
  - 6. Nonconforming and unsatisfactory items to be corrected.
  - 7. Remarks

**SECTION 014000  
QUALITY REQUIREMENTS**

- 1.7 Contractor's Test and Inspection Reports
- A. Prepare and submit to the Engineer a written report of each test or inspection signed by Contractor Quality Control Representative performing inspection within 2 days following day inspection was made.
  - B. Include the following on written reports of inspection:
    - 1. Cover sheet prominently identifying that inspection "CONFORMS" or "DOES NOT CONFORM" to Contract Documents.
    - 2. Date of inspection and date of report.
    - 3. Project name, location, solicitation number, and Contractor.
    - 4. Names and titles of individuals making inspection, if not Contractor's Project Field Superintendent.
    - 5. Description of Contract requirements for inspection by referencing Specification Section.
    - 6. Description of inspection made, interpretation of inspection results, and notification of significant conditions at time of inspection.
    - 7. Requirements for follow-up inspections.
- 1.8 Non-Compliance Check-Off List
- A. Maintain check-off list of work that does not comply with Contract Documents, stating specifically what is non-complying, date faulty work was originally discovered, and date work was corrected. No requirement to report deficiencies corrected same day it was discovered. Submit copy of Non-Compliance Check-Off List of non-complying work items to the Engineer on a weekly basis.
- 1.9 Completion and Inspection of Work
- A. Prior to final acceptance by the Engineer and issuance of a Certificate of Substantial Completion and/or Notice of Completion, submit a certification signed by Contractor to the Engineer stating that all work has been inspected and all work, except as specifically noted, is complete and in compliance with Contract Documents.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION

**SECTION 015000  
TEMPORARY FACILITIES AND CONTROLS**

**PART 1 - GENERAL**

**1.1 General**

- A. The Contractor must provide all temporary facilities and services required to complete the work and to comply with OSHA and other applicable regulations.
- B. The Contractor must maintain temporary facilities in a proper, safe, operating, and sanitary condition for the duration of this Contract. Upon completion of this Contract, all such temporary work and facilities shall be removed in their entirety.

**1.2 Project Sign**

- A. The Contractor must construct and erect a minimum of two hard hat signs at locations designated by the Engineer. The signs must be erected prior to the commencement of on-site work.

**1.3 Temporary Water**

- A. The County will not provide or maintain a temporary water supply system from the existing services required for construction under this project and will not pay any costs in connection with them.

**1.4 Temporary Electricity**

- A. Service Required: The County will provide temporary electric power throughout the construction period from the existing service. Contractor shall be responsible for connection. Contractor to provide power centers for miscellaneous tools and equipment used in the construction work, lighting for safe and adequate working conditions throughout site (at least 1/4 watts of incandescent lighting per square foot, with a socket voltage of at least 110 volts and using 100-watt lamps minimum); power for construction building.
- B. Safety: The Contractor must provide and maintain lights and signs to prevent damage or injury and must illuminate all hazardous areas. Safety lights must be operational from dusk to dawn.
- C. Requirements of Regulatory Agencies: The Contractor must obtain permits as required by local government authorities, comply with the National Electrical Code, applicable local codes, and utility regulations.
- D. Use of Permanent System: The Contractor must regulate any part of the permanent electrical system that is used for construction purposes to prevent interference with safety and with the orderly progress of the work. The Contractor must leave permanent electrical services in a condition as good as new.

**SECTION 015000**  
**TEMPORARY FACILITIES AND CONTROLS**

- E. Materials: The materials may be new or used in the temporary works but must be adequate in capacity for the purposes intended and must not create unsafe conditions or violate the requirements of applicable codes. At the Contractor's option, patented specialty materials may be used if UL-approved.
  - F. Conductors: The Contractor must use wire, cable, or busses of appropriate type, sized in accordance with the National Electrical Code for the applied loads. Use only UL-approved wire.
  - G. Equipment: In compliance with NEMA standards, the Contractor must provide an appropriate enclosure for the environment in which the equipment is used.
  - H. Installation: The Contractor must provide all required facilities, including transformers, conductors, poles, conduits, raceways, fuses, switches, fixtures, and lamps, located to avoid interference with cranes and materials-handling equipment, storage areas, traffic areas, and work under other contracts. The Contractor must install all work to have a neat and orderly appearance and to make it structurally sound throughout. The Contractor must maintain it to give continuous service and to provide safe working conditions. The Contractor must modify the service as required by the progress of the job.
  - I. Removal: The Contractor must remove all temporary equipment and materials upon completion of construction, repair all damage caused by the installation, and restore the area to satisfactory condition.
- 1.5 Sanitary Provisions
- A. The Contractor must provide and keep in neat and sanitary condition conveniences and accommodations for the use of the construction personnel necessary to comply with the requirements and regulations of the local department of health and of other authorities having jurisdiction.
- 1.6 Approaches and Exits
- A. The Contractor must provide all necessary approaches and exits required to properly execute the work.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION

**SECTION 016000  
PRODUCT REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 Product Options and Substitutions**

- A. Provide Products that comply with Contract Documents, which are undamaged and new at time of installation.
- B. Provide Products complete with accessories, trim, finish, safety guards, and other devices and details needed for complete installation and intended use and effect.

**1.2 Product Delivery Requirements**

- A. Transport and handle Products in accordance with manufacturer's instructions, using means and methods that will prevent damage, deterioration, and loss, including theft.
- B. Schedule Product delivery to minimize long-term storage at the Project sites and prevent overcrowding of construction spaces.
- C. Coordinate Product delivery with installation schedule to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
- D. Deliver Products to Project site in undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
- E. Promptly inspect shipments to ensure that Products comply with project requirements, quantities are correct, Products are undamaged, and properly protected.
- F. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

**1.3 Product Storage and Handling Requirements**

- A. Store and protect Products in accordance with manufacturers' published instructions, with seals and labels intact and legible.
- B. Store Products subject to damage by elements above ground, under cover in weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's published instructions.

**SECTION 016000  
PRODUCT REQUIREMENTS**

- C. For exterior storage of fabricated Products, place on sloped supports, above ground.
- D. Provide off-site storage and protection when Project site does not permit on-site storage or protection.
- E. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation or potential degradation of Product.
- F. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- G. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.
- H. Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION

**SECTION 017300  
EXECUTION**

**PART 1 - GENERAL**

**1.1 Meetings**

- A. Prior to issuing the Notice to Proceed, the Engineer will schedule a Pre-Construction Meeting with the Contractor to review the proposed construction schedule and delivery dates, arrange utility coordination and clarify inspection procedures.
  
- B. Notwithstanding any other provisions of the contract, the Contractor shall not be obligated to perform any work and the County shall not be obligated to accept or pay for any work performed by the Contractor prior to delivery of the Notice to Proceed. The County's knowledge of work performed prior to the delivery of the Notice to Proceed shall not obligate the County to accept or pay for such work. The Contractor shall provide the required contract bonds and evidence of insurance prior to commencing work at the site.

**1.2 Layout of Work**

- A. The Contractor must lay out its work to match existing or as indicated on the drawings. The Contractor must furnish, at its own expense, all stakes, templates, platforms, equipment, tools, materials, and labor as may be required in laying out any part of the work as indicated on the drawings.

**1.3 Contractor's Temporary Use of Facilities and Equipment**

- A. No new facilities or equipment intended for the permanent installation, including materials-handling vehicles, may be used for temporary purposes unless specified in the contract or unless the Contractor has the written permission of the Engineer.

**1.4 Cleaning**

- A. Cleaning During Construction:
  - 1. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
  - 2. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
  - 3. Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.
  - 4. Collect and remove waste materials, debris, and rubbish from site as specified in the Environmental Compliance and Management Plan as required in Section 01 3543 - Environmental Procedures.

**SECTION 017300**  
**EXECUTION**

B. Final Cleaning:

1. Use cleaning materials and agents recommended by manufacturer or fabricator of surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property, or that might damage finished surfaces.
2. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of Work to condition expected from a commercial building cleaning and maintenance program. Comply with manufacturer's published instructions.
3. Complete following cleaning operations before requesting the Engineer's inspection for Substantial Completion.
  - a. Clean Project Site, yard, and grounds if applicable, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste materials, litter and foreign substances. Sweep paved areas broom clean. Remove Petro-chemical spills, stains, and other foreign deposits. Rake grounds that are neither planted nor paved, to a smooth even-textured surface.
  - b. Remove tools, construction equipment, machinery, and surplus material from Project Site.
  - c. Clean exposed exterior and interior hard-surface finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
  - d. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
  - e. Broom clean concrete floors in unoccupied spaces.
  - f. Provide final cleaning, waxing, and buffing of resilient tile, in accordance with manufacturer's requirements.
  - g. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
  - h. Remove labels that are not permanent labels.
  - i. Touch-up and otherwise repair and restore marred exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored, or that show evidence of repair or restoration. Do not paint over "UL" and similar labels, including mechanical and electrical name plates.
  - j. Wipe surfaces of mechanical and electrical equipment, and other similar equipment. Remove excess lubrication, paint and mortar droppings and other foreign substances.
  - k. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

## **SECTION 017300**

### **EXECUTION**

- I. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills. Clean ducts, blowers, and coils if units were operated without filters during construction.
  - m. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned out bulbs, and defective and noisy starters in fluorescent and mercury vapor fixtures.
  - n. Leave Project clean and ready for occupancy.
4. Remove temporary protection and facilities installed during construction to protect previously completed installations during remainder of construction.
  5. Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from Project Site and dispose of in accordance with requirements of local authorities having jurisdiction.
    - a. Where extra materials of value remain after completion of construction have become County property, store these materials as directed by the Engineer.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION

**SECTION 017419**  
**CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes Procedures for achieving the most environmentally conscious Work feasible within the limits of the Construction Schedule, Contract Sum, and available materials, equipment, and products.
  - 1. Participate in promoting efforts of the County to create an energy-efficient and environmentally sensitive structure.
  - 2. Use recycled-content, toxic-free, and environmentally sensitive materials, and equipment.
  - 3. Use environmentally sensitive procedures.
    - a. Protect the environment, both on-site and off-site, during demolition and construction operations.
    - b. Prevent environmental pollution and damage.
    - c. Effect optimum control of solid wastes.
  
- B. Related Documents: The Contract Documents, as defined in Section 01 1000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents and prevailing County Ordinances.
  
- C. Related Sections:
  - 1. Section 014000 - Quality Requirements: Contractor's Daily Report.
  - 2. Section 015000 - Temporary Facilities and Controls: Temporary ventilation, progress cleaning and waste removal.
  - 3. Section 016000 - Product Requirements: Substitutions.
  - 4. Section 024119 – Selective Structure Demolition.

**1.2 DEFINITIONS**

- A. Adequate ventilation: Ventilation, including air circulation and air changes, is required to cure materials, dissipate humidity, and prevent accumulation of dust fumes, vapors, or gases.
  
- B. Construction and demolition waste: Includes solid wastes, such as building materials, packaging, rubbish, debris, and rubble resulting from construction, remodeling, repair, and demolition operations.
  - 1. Rubbish: Includes both combustible and noncombustible wastes, such as paper, boxes, glass, crockery, metal and lumber scrap, metal cans, and bones.
  - 2. Debris: Includes both combustible and noncombustible wastes, such as leaves and tree trimmings that result from construction or maintenance and repair work.

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### CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

- C. Chemical waste: Includes petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.
- D. Diversion: Redirection of waste ordinarily deposited in a municipal landfill to a recycling facility or to another destination for reuse.
- E. Environmental pollution and damage: The presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances; or degrade the utility of the environment for aesthetic, cultural, or historical purposes.
- F. Hazardous materials: Includes pesticides, biocides, and carcinogens as listed by recognized authorities, such as the Environmental Protection Agency (EPA) and the International Agency for Research on Cancer (IARC).
- G. Interior final finishes: Materials and products that will be exposed at interior, occupied spaces; including flooring, wallcovering, finish carpentry, and ceilings.
- H. Municipal Solid Waste Landfill: A permitted facility that accepts solid, non-hazardous waste such as household, commercial, and industrial waste, including construction and demolition waste.
- I. Packaged dry products: Materials and products that are installed in dry form and are delivered to the site in manufacturer's packaging; including carpets, resilient flooring, ceiling tiles, and insulation.
- J. Sediment: Soil and other debris that has been eroded and transported by storm or well production runoff water.
- K. Sanitary wastes:
  - 1. Garbage: Refuse and scraps resulting from preparation, cooking, distribution, or consumption of food.
  - 2. Sewage: Domestic sanitary sewage.
- L. Wet products: Materials and products installed in wet form, including paints, sealants, adhesives, and special coatings.

#### 1.3 SUBMITTALS

- A. Solid Waste Management and Environmental Protection Plan: Prepare and submit at the Preconstruction Meeting a Solid Waste Management and Environmental Protection Plan including, but not limited to, the following:
  - 1. Procedures for Recycling/Re-Use Program in compliance with the County recycling code.
  - 2. Schedule for application of interior finishes.

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### CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

3. Revise and resubmit Solid Waste Management and Environmental Protection Plan as required by the County.
  - a. Approval of the Contractor's Solid Waste Management and Environmental Protection Plan will not relieve the Contractor of responsibility for adequate and continuing control of pollutants and other environmental protection measures.
  
- B. With each Contractor's Report as specified in Section 01 4000 – Quality Requirements, submit an updated Summary of Solid Waste Disposal And Diversion. Submit on form in Appendix A of this Section. Include manifests, weight tickets, receipts, and invoices specifically identifying the Project and waste material for:
  1. Municipal Solid Waste Landfills.
  2. Recycling/Reuse Facilities.
  
- C. With Record Submittals as specified in Section 01 7704 - Closeout Procedures and Training, submit the following:
  1. Final Summary of Solid Waste Disposal and Diversion. Submit on form in Appendix A of this Section.
  2. Resource Conservation and Recovery Act Project Summary. Submit a form in Appendix B of this Section.

#### PART 2 PRODUCTS - NOT USED

#### PART 3 EXECUTION

##### 3.1 RECYCLING AND REUSE

- A. Collection: Implement a recycling/reuse program that includes separate collection of waste materials of the following types as appropriate to local and regional recycling/reuse facilities:
  1. Metal.
    - a. Ferrous.
    - b. Non-ferrous.
  2. Wood.
  3. Debris.
  4. Glass.
  5. Paper/Cardboard.
  6. Plastic.
  7. Gypsum.
  8. Paint.
  9. Others as appropriate.

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**CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

- B. Recycling/reuse centers: Contact governmental solid waste offices, Environmental Protection Agency (EPA) regional offices, and applicable non-profit organizations.
1. Metal.
    - a. Ferrous.
    - b. Non-ferrous.
  2. Wood.
  3. Debris.
  4. Glass.
  5. Paper/Cardboard.
  6. Plastic.
  7. Gypsum.
  8. Paint.
  9. Others as appropriate.
- C. Handling:
1. Clean materials which are contaminated prior to placing in collection containers. Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.
  2. Arrange for collection by or delivery to the appropriate recycling or reuse facility.
- D. Participate in re-use programs: identify local and regional re-use programs, including but not limited to non-profit organizations such as schools, local housing agencies, and public arts programs, that accept used materials. The following are examples for contractor's information only.
1. National materials exchange network, such as CAL-MAX a free service provided by various state and regional offices, designed to help businesses find markets for materials that traditionally would be discarded. The premise of the program is that material discarded by one business may be a resource for another business.
    - a. Items and regions covered by materials exchange programs may vary. Contact the applicable regional materials exchange program. In California, contact CAL-MAX at (916) 255-2369.
  2. Habitat For Humanity, a non-profit housing organization that rehabilitates and builds housing for low-income families.
    - a. Sites requiring donated materials vary. Contact the national hotline (800) HABITAT.
- E. Rebates, tax credits, and other savings obtained for recycled or re-used materials accrue to Contractor.

**3.2 ENVIRONMENTAL CONTROLS**

- A. Protection of natural resources: Preserve the natural resources within the Project boundaries and outside the limits of permanent Work performed under

**SECTION 017419**  
**CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

this Contract in their existing condition or restore to an equivalent or improved condition as approved by the Engineer, upon completion of the Work.

1. Confine demolition and construction activities to work area limits indicated on the Drawings and as directed by the Engineer.
  - a. Temporary construction: As specified in Section 01 5000 - Temporary Facilities and Controls.
  - b. Demolition and salvage operations: As specified in Section 02 4119 - Selective Structure Demolition.
  - c. Disposal operations for demolished and waste materials that are not identified to be salvaged, recycled, or reused:
    - 1) Remove debris, rubbish, and other waste materials resulting from demolition and construction operations, from site.
    - 2) No burning permitted.
    - 3) Transport materials with appropriate vehicles and dispose off-site to areas which are approved for disposal by governing authorities having jurisdiction.
    - 4) Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways. Remove spillage and sweep, wash, or otherwise clean project sites, streets, or highways.
    - 5) Comply with applicable regulations.
2. Water resources as follows:
  - a. Comply with requirements of the National Pollutant Discharge Elimination System (NPDES) and the State Pollutant Discharge Elimination System (SPDES).
  - b. Oily substances: Prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water.
    - 1) Store and service construction equipment at areas designated for collection of oil waste.
  - c. Mosquito abatement: Prevent ponding of stagnant water conducive to mosquito breeding habitat.
  - d. Prevent run-off from site during demolition and construction operations.
3. Land resources: Prior to construction, identify land resources to be preserved within the Work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without permission from The County.
4. Air Resources: Prevent creation of dust, air pollution, and odors.
  - a. Use water sprinkling, temporary enclosures, and other appropriate methods to limit dust and dirt rising and scattering in air to lowest practical level.
    - 1) Do not use water when it may create hazardous or other adverse conditions such as flooding and pollution.
  - b. Store volatile liquids, including fuels and solvents, in closed containers.
  - c. Properly maintain equipment to reduce gaseous pollutant emissions.
  - d. Interior final finishes: Schedule construction operations involving wet products prior to packaged dry products to the greatest extent possible

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**CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

in accordance with The County approved Solid Waste Management and Environmental Protection Plan.

- e. Temporary Ventilation: As specified in Section 01 5000 - Temporary Facilities and Controls, and as follows:
    - 1) Provide adequate ventilation during and after installation of interior wet products and interior final finishes.
    - 2) Provide adequate ventilation of packaged dry products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90-degree F maximum continuously during the ventilation period. Do not ventilate within limits of Work unless otherwise approved by County Engineer.
  - f. Pre-occupancy ventilation: After final completion and prior to initial occupancy, provide adequate ventilation for a minimum of 5 days. Pre- occupancy ventilation procedures:
    - 1) Use supply air fans and ducts only.
    - 2) Temporarily seal exhaust ducts.
    - 3) Temporarily disable exhaust fans.
    - 4) Provide exhaust through operable windows or temporary openings.
    - 5) Provide temporary exhaust fans as required to pull exhaust air from deep interior locations. Stair towers may be used for exhausting air from the building during the temporary ventilation.
    - 6) After pre-occupancy ventilation and prior to final testing and balancing of HVAC system, replace air filters and make HVAC system fully operational.
5. Noise Control: Perform demolition and construction operations to minimize noise. Perform noise producing work in less sensitive hours of the day or week as directed by the Engineer.
- a. Repetitive, high level impact noise will be permitted only between the hours permitted in the County Noise Ordinance. Do not exceed the limitations specified by OSHA.
  - b. Provide equipment, sound-deadening devices, and take noise abatement measures that are necessary for compliance.

END OF SECTION

**SECTION 017419  
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

Appendix A

SUMMARY OF SOLID WASTE DISPOSAL AND DIVERSION

Project Name: \_\_\_\_\_  
 Contractor Name: \_\_\_\_\_ License Number: \_\_\_\_\_  
 Contractor Address: \_\_\_\_\_

<b>Solid Waste Material</b> (why diverted)	<b>Date</b> (Comments Material Disposed/ Diverted)	<b>Amount</b> <b>Disposed/ Diverted</b> (ton or cu.yd)	<b>Municipal Solid Waste Facility</b> (name, address, & phone number)	<b>Recycling/Reuse Facility</b> (if disposed, (name, address, & phone number) not	
Metal					
Wood					
Debris					
Glass					
Paper/ Cardboard					
Plastic					
Gypsum					
Paint					
Carpet					
Other:					

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

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CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

Appendix B

RESOURCE CONSERVATION AND RECOVERY ACT - PROJECT SUMMARY.

Project Name: \_\_\_\_\_  
Contractor Name: \_\_\_\_\_ License Number: \_\_\_\_\_  
Contractor Address: \_\_\_\_\_

1.0 EPA GUIDELINE ITEMS

A. Building Insulation Products:

1. Total dollar amount of building insulation products provided for this project.  
\$ \_\_\_\_\_.
2. Total dollar amount of building insulation products containing recycled materials provided for this project. \$ \_\_\_\_\_.
3. Were there any technical impediments to increasing the amount of building insulation products containing recycled materials provided for this project?

a. If yes, please explain. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_.

B. Carpet:

1. Total dollar amount of carpet provided for this project.  
\$ \_\_\_\_\_.
2. Total dollar amount of carpet containing recycled materials provided for this project. \$ \_\_\_\_\_.
3. Were there any technical impediments to increasing the amount of carpet containing recycled materials provided for this project?

a. If yes, please explain. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_.

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CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

C. Floor Tiles (resilient):

1. Total dollar amount of floor tile (resilient) provided for this project.  
\$ \_\_\_\_\_.
2. Total dollar amount of floor tile (resilient) containing recycled materials provided for this project. \$ \_\_\_\_\_.
3. Were there any technical impediments to increasing the amount of floor tile (resilient) containing recycled materials provided for this project?  
\_\_\_\_\_  
a. If yes, please explain. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_.

D. Floor Tiles (ceramic):

1. Total dollar amount of floor tile (ceramic) was provided for this project.  
\$ \_\_\_\_\_.
2. Total dollar amount of floor tile (ceramic) containing recycled materials provided for this project. \$ \_\_\_\_\_.
3. Were there any technical impediments to increasing the amount of floor tile (ceramic) containing recycled materials provided for this project?  
\_\_\_\_\_  
a. If yes, please explain. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_.

2.0 SPECIFICATIONS

NOT USED

3.0 SOLID WASTE PREVENTION

- A. Total dollar amount of solid waste disposed (landfill) for this project.  
\$ \_\_\_\_\_.
- B. Total weight of solid waste disposed (landfill) for this project.  
\$ \_\_\_\_\_.

4.0 RECYCLING

- A. The total dollar value of solid waste diverted from landfill and recycled or reused for this project. (Express as total dollar amount for solid waste disposal in landfill for equivalent type and amount of diverted waste.) \$ \_\_\_\_\_.

**SECTION 017419  
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

- B. Total weight of solid waste diverted from landfill and recycled or reused for this project. (Express as total weight for solid waste disposal in landfill for equivalent type and amount of diverted waste.)     \$ \_\_\_\_\_.

5.0 COMMENTS

- A. Comments and suggestions for increasing amount of recycled materials used in construction materials.

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- B. Comments and suggestions for improving solid waste prevention and recycling efforts during construction.

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Signature: \_\_\_\_\_ Date: \_\_\_\_\_

NOT FOR BID

**SECTION 017704**  
**CLOSEOUT PROCEDURES AND TRAINING**

**PART 1 - GENERAL**

**1.1 Manuals**

- A. Purpose: Operation and maintenance manuals are for the training of, and use by, County employees in the operation and maintenance of the systems and related equipment as specified below. The manuals must consist of instruction on systems and equipment. A separate manual or chapter must be prepared for each of the following classes of equipment or system:
1. Doors & Windows.
  2. Plumbing systems.
  3. Mechanical systems
  4. Electrical systems.
  5. Miscellaneous building equipment and systems.
- B. Submittal, In both "hard" and electronic DVD, CD-ROM or flash drive format:
1. Preliminary Submittal: Two draft copies of the completed manuscript for items in this outline must be submitted to the County Engineer for review within 30 days after approval of equipment to be provided. One copy will be returned to the Contractor within 15 days after submittal and, if required, must be revised, and resubmitted within 15 days.
  2. Final Submittal: four complete sets of manuals must be furnished to the Engineer not later than 30 days before completion of the project.
  3. Final Submittal must be accepted by the Engineer before training can begin.

**1.2 Other Closeout Submittals**

- A. Additional requirements for Systems Manuals, Operating Instructions, Warranties, Training, and other deliverables are contained in individual Specification Sections. All closeout requirements must be provided to and accepted by the Engineer prior to requesting final payment. Examples of additional closeout requirements include, but are not limited to, the following.
1. Final Punch-List with all items certified as complete.
  2. Record "As Built" Drawings, the Contractor shall submit certified As-Built Record Drawings and Specifications in the quantities and media specified.
  3. Warranty, the Contractor shall submit all transferable guarantees and warranties for equipment, materials and installations furnished by any manufacturer, supplier, or installer.
  4. Signed Asbestos and Lead-Based Paint Certificate.
  5. Survey Report.
  6. Material Safety Data Sheets
  7. Signed and sealed Contractor Release of Claims.

**SECTION 017704  
CLOSEOUT PROCEDURES AND TRAINING**

8. Payment for items of work covered in the plans specifications Division 1 will be based on the lump sum unit bid price for mobilization. No additional compensation will be allowed.

1.3 MAINTENANCE

- A. Extra Materials – Paint, Rubber Base, Porcelain Tile, Sheet Vinyl, Luxury Vinyl Composite Tile, or similar finishes: Full-size units equal to five (5%) percent of amount installed for each type, and color, pattern, and dyes. Provide extra material not noted here but reference in other specifications for this project.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION

**SECTION 02 2600  
ABATEMENT OF HAZARDOUS MATERIALS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

**A. Section Includes:**

1. Abatement of hazardous materials identified in the L.Y. Environmental, Inc. Report dated August 8, 2023. Furnish labor, materials, supplies, and incidentals required, protect Project site personnel and the surrounding public from exposure to potentially hazardous substances, and prevent the spread of potentially contaminated or hazardous substances.
2. The furnishing of labor, supervision, materials, equipment, tools, permits, manifesting, and services required in the characterization, transportation, and disposal of identified or suspected hazardous substances. The suspect substance may be in drums, containers, stockpiled, or may exist as debris piles on the Project site.

**B. Related Requirements:**

1. Division 01 - General Requirements.
2. Section 02 4119 – Selective Structure Demolition

**C. Regulatory Requirements shall include, but not be limited to: Comply with laws, ordinances, codes, rules, and regulations of the Federal, State, and local authorities having jurisdiction over any of the Work specified herein. Comply with federal EPA and state Department of Transportation regulations for shipping of hazardous substances to offsite disposal facilities. Comply with any regulatory requirements imposed by the treatment, storage, and disposal facility. Regulations pertaining to the transport and disposal of hazardous substances/materials include, but are not limited to, the following:**

1. Department of Transportation 49 CFR 172 through 179.
2. Department of Transportation 49 CFR 387 (46 FR 30974, 47073).
3. Department of Transportation DOT-E 8876.
4. Environmental Protection Agency 40 CFR 136 (41 FR 52779).
5. Environmental Protection Agency 40 CFR 261, 262 and 761.
6. Resource Conservation and Recovery Act (RCRA).

**D. Any transporter of hazardous substances shall be licensed in the state in which handling, and transportation will take place in accordance with applicable regulations.**

**SECTION 02 2600  
ABATEMENT OF HAZARDOUS MATERIALS**

- E. Comply with OSHA (Occupational Safety and Health Administration) Standards and Regulations contained in Title 29 Code of Federal Regulations, Part 1910.120 "Hazardous Waste Operations and Emergency Response."
- F. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.2 QUALITY ASSURANCE

- A. The Work of this Section shall be performed by an entity possessing the following minimum qualifications:
  - 1. Contractors License in the state where the Work is performed, supplemented by a Hazardous Waste specialty license, where applicable (i.e., California).
  - 2. MCS 90 Endorsement on Liability Insurance.
  - 3. Pollution Liability Insurance in the amount of \$2,000,000 occurrence.
  - 4. Forty-hour OSHA Training and site-specific health and safety plan for its employees proposed to work at the Project site as defined in 29 CFR 1910.120.
  - 5. A Comprehensive Quality Assurance Plan on file with the California Environmental Protection Agency.
  - 6. Project site personnel shall wear personal protective equipment and protective clothing consistent with the levels of protection required for this Work as specified by OSHA (29 CFR Part 1910.120).

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 ABATEMENT OF HAZARDOUS MATERIALS

- A. Abate hazardous materials including hazardous materials identified in the Clark Seif Clark, Inc. Assessment Report.

3.2 CONTAINMENT OF RELEASED SUBSTANCES

- A. If a hazardous material is OR appears to be leaking or otherwise spreading, contain the release of the material. Provide measures to prevent the release of the material to the environment and protect Project site personnel, adjacent properties and occupants, and the public from potential exposure.
- B. During substance containment or evacuation of Project site personnel, protect personnel (onsite workers, non-workers, or the public) from contact with or exposure to the released substances.

**SECTION 02 2600  
ABATEMENT OF HAZARDOUS MATERIALS**

- C. The abatement or evaluation of any suspected hazardous material shall only be performed by professionally trained and/or certified personnel.

**3.3 HEALTH AND SAFETY**

- A. In an emergency or imminent hazard situation the health and safety of personnel on or near the Project site are the responsibility of the Work of this section. Immediately notify the office of Environmental Health and Safety (EHS) and the of the Owner. Owner will notify Federal, State and Local regulatory authorities, if required.
- B. Project site personnel or members of the public who have been exposed to or have come in contact with any hazardous materials or chemicals shall be immediately transported to the nearest hospital.

**3.4 TESTING, TRANSPORT, AND DISPOSAL OF HAZARDOUS SUBSTANCES**

- A. Collect one composite sample from each media type (solid, liquid, or sludge) of potentially hazardous substance stored in drums, stockpiled, or otherwise identified at the Project site for the purposes of obtaining approvals for proper transport and disposal of the suspect materials. Submit analytical results to a representative of the Owner Consultant, as designated by the owner.
- B. If required, overpack any leaking or deteriorated drums to prevent leaks or spills, and pack small 5-gallon containers into larger new 55-gallon drums. Cover solid waste materials and stockpiled soils with an HDPE liner to prevent storm water runoff from contaminating surrounding areas.
- C. Prepare manifests, material profiles, and submit lab analysis for drums/containers and any other documentation required by the receiving facility for signature by a representative of the Owner Consultant and/or Owner. Copies of waste profiles, manifests, and disposal documentation shall be submitted to the Owner, prior to disposal and/or transporting of hazardous substances.
- D. Coordinate waste sampling and analysis requirements with the disposal facility and properly complete profiling and transport documents prior to loading and transport.
- E. A State registered "Hazardous Waste Hauler" shall transport the waste to a lawfully permitted and Owner approved facility.
- F. Load, handle, and transport 55-gallon drums and other waste containers to the appropriate disposal facility in accordance with Federal and State regulations.
- G. Transport documentation from the receiving facility verifying acceptance and receipt of drums/containers at the facility and sampling and associated test results shall be submitted to the Owner, within fifteen days following receipt of hazardous substances to the disposal facility.

**SECTION 02 2600  
ABATEMENT OF HAZARDOUS MATERIALS**

- I. Materials identified as hazardous waste under RCRA are not permitted to remain at the Project site more than 30 days after being deemed to be hazardous waste. During this period of Project site storage, provide precautions to contain and prevent the release of hazardous or potentially hazardous materials to the environment.

END OF SECTION

NOT FOR BID

**SECTION 02 4119  
SELECTIVE STRUCTURE DEMOLITION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Procedures for demolition and removal of existing building elements.
  - 2. Removal of designated building equipment and fixtures.
  - 3. Salvaged items.
  - 4. Salvaged material.
  - 5. Salvaged items for re-use.
  
- B. Related Documents: The Contract Documents, Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
  
- C. Related Sections:
  - 1. Division 1 - Environmental Procedures: Recycling and reuse of waste materials.

**1.2 SYSTEM DESCRIPTION**

- A. The extent of Selective Demolition Work is that Work necessary and required to facilitate the new construction indicated.
  
- B. Demolition shall be such that all construction, new and existing, can be performed, and completed in accordance with the construction documents.
  
- C. The contractor shall visit the project site and familiarize himself with the existing conditions and project requirements.
  
- D. Verify the scope of the Work under this Section including salvage material. The County will be responsible for removing all materials and equipment which the County wishes to salvage prior to the beginning of this Work unless noted otherwise.

**1.3 QUALITY ASSURANCE**

- A. Performance Criteria:
  - 1. Requirements of Structural Work: Do not cut structural work in a manner resulting in a reduction of load-carrying capacity of load/deflection ratio.
  - 2. Operational and Safety Limitations: Do not cut operational elements and safety-related components in a manner resulting in a reduction of

**SECTION 02 4119**  
**SELECTIVE STRUCTURE DEMOLITION**  
capacities.

**NOT FOR BID**

**SECTION 02 4119  
SELECTIVE STRUCTURE DEMOLITION**

to perform in a manner intended or resulting in a decreased operational life, increased maintenance, or decreased safety.

3. Visual Requirements: Do not cut work which is exposed on the exterior or exposed in occupied spaces of the building in a manner resulting in a reduction of visual qualities or resulting in substantial evidence of the demolition work judged by the Engineer to be cut and patched in a visually unsatisfactory manner.
4. Loading: Do not superimpose loads at any point upon existing structure beyond design capacity including loads attributable to materials, construction equipment, demolition operations and shoring and bracing.
5. Vibration: Do not use means, methods, techniques, or procedures which would induce vibration into any element of the structure.
6. Fire: Do not use means, methods, techniques, or procedures which would produce any fire hazard unless otherwise approved by the Engineer.
7. Water: Do not use means, methods, techniques, or procedures which would produce excessive water run-off, and water pollution.
8. Air Pollution: Do not use means, methods, techniques, or procedures which would produce uncontrolled dust, fumes, or other damaging air pollution.

**1.4 PROJECT SITE**

- A. Indicated "Existing Construction" was obtained from existing drawings or other information which may not reflect actual conditions. The Contractor shall verify all existing conditions and notify the Engineer of discrepancies before proceeding with the Work.
- B. Perform the removal, cutting, drilling, etc., of existing work with extreme care, and using small tools in order not to jeopardize the structural integrity of the building.
- C. Occupancy: Contractor shall have full use of the facility during construction.
- D. Condition of Structure: The County assumes no responsibility for the actual condition of portions of the structure to be demolished.
- E. Partial removal: Items of salvageable value to the Contractor may be removed from the structure as the work progresses if not claimed by the County. Salvaged items must be transported from the site as they are removed.
- F. Protection: Make sure that the safe passage of people around the area of demolition is maintained during the demolition operation. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.

**SECTION 02 4119  
SELECTIVE STRUCTURE DEMOLITION**

**1.5 PROTECTION OF EXISTING CONSTRUCTION**

- A. Provide temporary protection of existing construction (floors, roof, and walls) when adjoining new work and in traffic areas.
- B. Provide temporary construction, constructed of framing and plywood, to protect existing construction and surrounding surfaces from damage by movement of materials and personnel.
- C. The contractor is responsible for all damage to the existing structure and shall replace or repair all areas of damage.
- D. Repair, replace, or rebuild existing construction as required or as directed which has been removed, altered, or disrupted to allow for new construction. Existing construction shall be corrected to match adjacent construction, new or existing.
- E. Perform cutting of existing concrete and masonry construction with saws and core drills. Do not use jackhammers or explosives.

**1.6 SHORING AND BRACING**

- A. Provide temporary shoring of existing construction to allow removal of existing structural elements. Maintain shoring until new structural elements are in place and accepted by the Engineer and County Inspector(s).

**PART 2 - PRODUCTS**

**2.1 SALVAGED ITEMS**

- A. The Contract Documents indicate the existing materials that are to be reinstalled in the new construction. The Contractor shall remove, protect, and reinstall these items as indicated.
  - 1. Items for "Reinstallation" will be indicated as such within the Contract Documents.
- B. Materials scheduled for reinstallation which are damaged by the Contractor to the extent that they cannot be reinstalled shall be replaced by the Contractor with equal quality material at no additional cost to the County.
- C. Coordinate with the Engineer on disposition of salvage items note scheduled for reinstallation, demolished materials, and equipment. Salvaged materials, not reinstalled, shall be delivered, as directed, to the County.

**SECTION 02 4119  
SELECTIVE STRUCTURE DEMOLITION**

**2.2 SALVAGED MATERIALS**

- A. Removed and salvaged materials of value not designated for reinstallation, unless claimed as salvage by the County, shall become the property of the Contractor and shall be removed from the premises by the Contractor and recycled, reused, or disposed of as specified in Section 013543- Environmental Procedures.
- B. The County will remove or, under separate contract, have all materials and equipment which the County requires removed prior to Work under this Section begins.

**2.3 SALVAGED ITEMS FOR RE-USE**

- A. Materials and items scheduled for re-use which are damaged by the contractor to the extent which they cannot be re-used shall be replaced by the Contractor at no additional cost to the County.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Section 01 7000 – Execution and Closeout Requirements: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates, and conditions are as required, and ready to receive Work.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the County.

**3.2 PREPARATION**

- A. Temporary Support: Provide adequate temporary support for work to be cut to prevent failure. Do not endanger other work.

**SECTION 02 4119  
SELECTIVE STRUCTURE DEMOLITION**

- B. Provide adequate protection of other work during selective demolition to prevent damage and provide protection of the work from adverse weather exposure.

**3.3 PROCEDURE**

- A. Employ only skilled tradesmen to perform selective demolition.
- B. Cut work by methods least likely to damage work to be retained and work adjoining.
- C. In general, where physical cutting action is required, cut work with sawing, and grinding tools, not with hammering and chopping tools. Core drill openings through concrete and masonry work.
- D. Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.
- E. Where selective demolition terminates at a surface or finishes to remain, completely remove all traces of material selectively demolished, including mortar beds. Provide smooth, even, substrate transition.

**3.4 POLLUTION CONTROLS**

- A. Use temporary enclosures and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level. Comply with AQMD standards.
- B. Comply with governing authorities pertaining to environmental protection.
  - 1. Protect natural resources as specified in Division 1 - Environmental Procedures.
- C. Clean adjacent portion of the structure and improvement of dust, dirt and debris caused by demolition operations, as directed by the Engineer and governing authorities. Return adjacent areas to their condition prior to the start of the work.

**3.5 DISPOSAL OF DEMOLISHED MATERIALS**

- A. Collect, recycle, reuse, and dispose of demolished materials as approved by the County in the Solid Waste Management and Environmental Protection Plan.

**3.6 SCHEDULE OF SELECTIVE DEMOLITION**

**SECTION 02 4119**  
**SELECTIVE STRUCTURE DEMOLITION**

- A. Slab on Grade:
1. Where indicated, saw cut perimeter of existing slab minimum of 50 percent of slab thickness to provide a breaking point to remove existing concrete.
  2. Break concrete slab to be removed into portions easily removed, maximum 3-foot dimensions in any side.
  3. Remove all concrete pieces within the removed area down to the existing subgrade.
- B. Plumbing:
1. Remove all plumbing fixtures and accessories including all exposed supply, waste, and vent piping.
  2. Concealed piping within and below slab construction shall be identified and capped a minimum of 3 inches (8 cm) below the finish floor.
- C. MECHANICAL
1. Existing HVAC, exhaust, and mechanical equipment to be removed OR salvage per plans.
  2. Remove all mechanical equipment accessories including all exposed supply, condensate, and electrical conduits & wiring and prepare for new work.
- D. Electrical Service:
1. All electrical circuits within the existing structure shall be abandoned from the existing service entrance section, beyond.
  2. Remove all abandoned electrical conduit, boxes, and wiring back to the existing electrical service which is to remain.
- E. Provide additional selective demolition as indicated and required by the Contract Documents and as required for indicated new construction.

END OF SECTION

**SECTION 02 8200  
ASBESTOS-RELATED DEMOLITION WORK**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section consists of furnishing all work necessary to perform asbestos-related demolition of asbestos-containing and/or contaminated materials located within the project limits. All work shall be performed in accordance with all federal, state, and local requirements and statutes. The work specified herein shall be the removal of asbestos-containing materials by persons knowledgeable, qualified, trained, and experienced in the removal, treatment, handling, transportation, and disposal of asbestos-containing material, and the subsequent cleaning of the affected environment. These persons shall comply with all federal, state, and local regulations and mandated work practices, and shall be capable of performing the work in the Contract.

**1.2 SCOPE OF WORK**

- A. General Requirements: Work of this section includes but is not limited to the following:
1. Obtaining all notifications and permits required to perform the work.
  2. Developing a detailed asbestos-related demolition work plan, including work sequence, work area isolation, HVAC and electrical isolation and decommissioning, asbestos removal methods, and transport/disposal procedures. This work plan shall be coordinated with the lead-related demolition work plan in Section 02081.
  3. Removing and legally disposing of all asbestos-containing materials (ACM) and asbestos contaminated materials disturbed by the project and removed from the project site.
  4. Thoroughly cleaning the area of work and obtaining final visual inspection approval from the Client's Representative. Clearance air monitoring performed by Phase Contrast Microscopy (PCM) (NIOSH Method 7400) will be performed for negative pressure enclosures.
  5. The Contractor shall retain a third-party asbestos consulting firm to perform an exposure assessment and perform exposure monitoring. The third-party consulting firm shall perform monitoring for a minimum of two days while asbestos-related demolition is being performed.
  6. The Contractor shall perform employee exposure monitoring as required by Cal-OSHA during the project.

**SECTION 02 8200  
ASBESTOS-RELATED DEMOLITION WORK**

- B. Project Specific Requirements: The Contractor shall remove, transport, and properly dispose of the following materials. Refer to the drawings at the end of this section for the location of the materials referenced below. **It is the abatement contractor's responsibility to verify the quantities and location of all known asbestos-containing materials.**

1. Asbestos-containing (less than 1%) floor tiles in kitchen (approx. 400 SF).

1.3 RELATED WORK

- A. SECTION 01 3300 – SUBMITTAL PROCEDURES  
B. SECTION 01 4000 – QUALITY REQUIREMENTS

1.4 REQUIRED LICENSURE

- A. The prospective Asbestos Abatement Contractor shall provide documentation of current and valid licensing in the State of California in accordance with the provisions of Chapter 9, Division (as amended) of the Business and Professions Code.
- B. The prospective Asbestos Abatement Contractor shall provide documentation of current and valid certification in the State of California to perform asbestos-related work by the Contractors' State License Board.
- C. The prospective Asbestos Abatement Contractor shall provide documentation of current and valid registration with the California Department of Industrial Relations - Division of Occupational Safety and Health (DOSH) to perform asbestos-related work.
- D. Transportation of Friable and Non-Friable Asbestos-Containing Materials: Contractor shall itself be, or have a subcontractor that is, a registered hazardous waste transporter with the State of California, Department of Toxic Substances Control.

1.5 APPLICABLE DOCUMENTS AND REGULATIONS

- A. It is the responsibility of the Contractor to know the current regulations controlling work and to perform all related work in accordance with such regulations that provide for worker and public safety against asbestos exposure.
- B. The publications listed below form a part of this specification to the extent referenced. The current issue of each document shall govern. Where conflict among requirements or with these Specifications exists, the more stringent requirements shall apply.

**SECTION 02 8200  
ASBESTOS-RELATED DEMOLITION WORK**

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR Part 1910	Occupational Safety and Health Standards for General Industry
29 CFR 1910.1200	Hazard Communications
29 CFR 1910.134 29 CFR 1910.145	Respiratory Protection Specifications for Accident Prevention Signs and Tags
29 CFR 1910.1020 29 CFR Part 1926	Access to Employee Medical Records Occupational Safety and Health Regulations for Construction
29 CFR 1926.1101	Construction Standard for Asbestos, Tremolite, Anthophyllite and Actinolite

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

40 CFR 61 Sub A & B 40 CFR 61 Sub M	General Provisions National Emissions Standard for Hazardous Air Pollutants (NESHAP)
40 CFR 260	Hazardous Waste Management Systems: General
40 CFR 261 40 CFR 262	Identification and Listing of Hazardous Waste Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268 40 CFR 763 Sub G 40 CFR 763	Land Disposal Restrictions Worker Protection Rule Asbestos Hazard Emergency Response Act (AHERA)

U.S. DEPARTMENT OF TRANSPORTATION (DOT)

49 CFR 171 & 172	Transportation of Hazardous Waste
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NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701	(1989) Methods of Fire Test for Flame Resistant Textiles and Films
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UNDERWRITERS LABORATORIES (UL)

**SECTION 02 8200  
ASBESTOS-RELATED DEMOLITION WORK**

UL 586 (1990) High-Efficiency Particulate Air Filter Units

CALIFORNIA CODE OF REGULATIONS (CCR)

Title 8 5208 General Industry Safety Orders - Asbestos  
Title 8 Article 2.5 Registration - Asbestos Related Work  
Title 8 5194 Hazard Communication  
Title 8 1529 Construction Industry Safety Orders - Asbestos  
Title 22 Div. 4 Cpt. 30 Hazardous Waste Handling

CALIFORNIA LABOR CODE Section 6501.5-6505.5

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

Rule 1403 Asbestos Emissions from Demolition / Renovation Activities

1.6 NOTIFICATIONS AND PERMITS

- A. Contractor shall make all required written notifications or applications to regulatory agencies including the following:
1. South Coast Air Quality Management District: SCAQMD Notification shall be in accordance with Rule 1403.
  2. California Division of Occupational Safety and Health; Notification shall be in accordance with Section 341.9 of Title 8 of the California Code of Regulations.
- B. Notifying the appropriate County department to obtain permission to discharge filtered waste (shower) water to the sewer system, if applicable.
- C. Obtaining any County permits required for asbestos abatement or construction activities.
- D. The Asbestos Abatement Contractor shall provide a copy of all notices and permits to the San Bernardino County.

1.7 SUPERVISOR/COMPETENT PERSON, FOREPERSON, AND WORKERS

- A. The Contractor shall always have an Asbestos-Related Demolition Supervisor/Competent Person present while asbestos-related work on this Contract is in progress.

**SECTION 02 8200  
ASBESTOS-RELATED DEMOLITION WORK**

- B. The Asbestos Related Demolition Supervisor/Competent Person shall have successfully completed a five (5) day EPA-approved Asbestos Abatement Contractor/Supervisor training course and be thoroughly familiar and experienced with asbestos removal and related work and shall be familiar with and enforce the use of all safety procedures and equipment. He/she shall be knowledgeable of all EPA, OSHA, and NIOSH requirements and guidelines.
- C. In addition to the Asbestos-Related Supervisor/Competent Person, the Contractor shall furnish one (1) or more forepersons who have successfully completed a five (5) day EPA- approved Asbestos Abatement Contractor/Supervisor training course, and who are familiar and experienced with asbestos abatement and its related work, safety procedures, and equipment.
- D. It shall be a requirement of this Contract that the Contractor's Asbestos-Related Demolition Supervisor/Competent Person and one or more of the foremen be always onsite while work is in progress. A foreman will be required to conduct inspections of the work practices, and enclosure condition inside the work area at least three (3) times during each work shift.
- E. All workers shall, at a minimum, have successfully completed a four (4) day EPA-approved Asbestos Abatement Worker training course.

**1.8 SUBMITTALS**

- A. Submit, as applicable, the following to the Client's Representative for approval within 10 days of receiving the Notice to Proceed. These submittals are in addition to those required in Section 01340. These submittals shall be submitted in accordance with Section 01340.
  - 1. Copies of the written notification to the following regulatory agencies:
    - a. SCAQMD Rule 1403
    - b. California Division of Occupational Safety and Health.
  - 2. Copies of waste haulers Hazardous Waste Transporter Registration and Environmental Protection Agency Acknowledgment of Notification of Hazardous Waste Activity.
  - 3. Identification of the landfill to be used for the disposal of the asbestos-containing waste generated at the project site and the landfill disposal and packaging requirements.
  - 4. A written asbestos abatement work plan identifying work sequence, abatement duration, dust control measures, work area preparation, personal protection equipment to be utilized, asbestos-containing materials removal procedures, asbestos- containing/contaminated debris cleanup and disposal procedures, and waste handling, storage, and disposal procedures.

**SECTION 02 8200**  
**ASBESTOS-RELATED DEMOLITION WORK**

5. Manufacturer's certification that HEPA vacuums, differential pressure air filtration devices and other local exhaust ventilation equipment conform to ANSI Z9.2-79.
  6. Manufacturer's product data and material safety data sheet(s) for all chemical products to be used on the site.
  7. Identification of the project's Asbestos Related Demolition Supervisor/Competent Person who meets the requirements of 29 CFR Part 1926.1101 and 8 CCR Part 1529 and is experienced in administration and supervision of asbestos abatement projects, including work practices, protective measures for building and personnel, disposal procedures, etc.
  8. Documentation that the Contractor's employees performing asbestos removal, disposal, and air sampling operations have received training which meets the criteria of the Federal EPA Model Accreditation Plan (40 CFR Part 763, Subpart E, Appendix C).
    - a. Training certification shall be provided prior to the start of work involving asbestos abatement, for all the Contractor's workers, forepersons, and Asbestos-Related Demolition Supervisors / Competent Persons. Training shall meet the requirements of 29 CFR Part 1926.1101 and 8 CCR Part 1529 and the criteria of the Federal EPA Model Accreditation Plan (40 CFR Part 763, Subpart E, Appendix C). Training shall be provided prior to the time of job assignment and, at least, annually.
  9. Documentation from a physician that employees or agents who may be exposed to airborne asbestos fibers more than the Permissible Exposure Limit have received medical monitoring to determine whether they are physically capable of working while wearing the respirator required without suffering adverse health effects. Contractor shall be aware of and provide information to the examining physician about unusual conditions in the workplace environment (e.g., high temperatures, humidity, and chemical contaminants) that may impact on the employee's ability to perform work activities. Medical monitoring shall be performed in accordance with the requirements of 29 CFR Part 1926.1101 and 8 CCR Part 1529.
  10. Documentation of respirator fit testing for Contractor employees and agents who must enter the work area. This fit testing shall be in accordance with qualitative procedures as required by OSHA regulations or be quantitative in nature.
  11. Documented NIOSH approvals for respiratory protective devices utilized on site, including manufacturer's certification of HEPA filtration capabilities for cartridges and filters.
- B. Upon completion of all asbestos abatement activities, submit to the Client's Representative, documentation that includes, without limitation, the following:
1. Work area entry/exit logbook. The logbook must record the name, affiliation, time in, and time out for each entry into the work site.

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2. Material Safety Data Sheets (MSDS) for solvents, encapsulants, wetting agents and replacement materials, as necessary.
3. OSHA required personal air monitoring results.
4. Accident/incident reports where injury or damage has occurred on or to the Client's property.
5. Hazardous waste manifests, non-hazardous waste data forms, trip tickets and disposal receipts for asbestos waste materials removed from the work area within 24 hours of the transport. Send to:

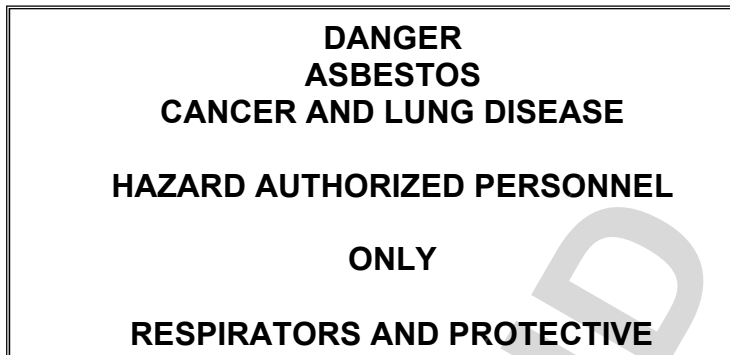
Alfonso Fausto, Project Manager  
San Bernardino County Special  
Districts  
222 W. Hospitality Lane, 2<sup>nd</sup> Floor,  
San Bernardino, CA 92415  
Phone 909-386-8827  
[Alfonso.fausto@sdd.sbcounty.gov](mailto:Alfonso.fausto@sdd.sbcounty.gov)

1.9 NOTICES AND POSTINGS

- A. Post in the decontamination unit, a list containing the names, addresses, and telephone numbers of the Contractor, Client's Representative, Project Environmental Manager, and emergency contact numbers.
- B. Additional postings shall include:
  1. Visitor entry and exit log.
  2. Employee daily sign in/out log.
  3. Work area entry and exit procedures.
  4. Emergency procedures.
- C. One copy of the Cal-OSHA Regulations
- D. Posted Warnings and Notices: The following regulations, warnings, and notices shall be posted at the work site in accordance with 29 CFR Part 1926.1101 and 8 CCR Part 1529.
  1. Warning Signs and Labels: Warning signs shall be provided at building entrances and approaches to asbestos abatement areas. Signs shall be located at a sufficient distance from the asbestos control areas that will allow personnel to read the sign and take the necessary protective actions required before entering the asbestos control area.
  2. Post at least two (2) safety warning signs, in English and Spanish, which follow the "Sample Format Warning Sign" shown below:

Sample Format Warning Sign  
Minimum Size - 24" x 36"  
Material - Aluminum or Fiberglass  
Script:

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Color - Black Letters on Red Background

**1.10 WORK AREA SECURITY**

- A. The asbestos work control area shall be restricted only to authorize personnel, including Contractor, Contractor's employees, Client's Representative(s), and state, and local inspectors.
- B. Entry into the asbestos work control area by unauthorized individuals shall be reported immediately to the Client's Representative.
- C. Contractor shall be responsible for Project site security during asbestos-related demolition operations to protect work efforts and equipment.

**1.11 WORK SEQUENCE**

- A. Work Sequence: The following is the work sequence for the project.
  - 1. The Test Sections shall be the first work performed by the Contractor.
  - 2. Following completion of the Test Sections, the Contractor shall perform removal of the asbestos-containing materials interior and exterior of the building.
  - 3. Following completion of the materials on the interior and exterior of the building and clearance air sampling, the Contractor shall perform removal of the lead-containing materials as identified in Section 028333.

**1.12 PERSONAL PROTECTION AND SAFETY**

- A. The Contractor alone shall be responsible for the safety, efficiency, and adequacy of his/her appliances, methods, and for any damages which may result from his/her operations, improper construction practices, or maintenance. He shall erect and properly always maintain as required by the conditions and progress of

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the work, proper safeguards for the protection of workers and the public and shall post warning signs around the job site.

- B. Respiratory protection requirements:
1. All respiratory protection programs shall be established in accordance with the respiratory protection requirements of 29 CFR Part 1910.134, 8 CCR Part 5144, 29 CFR Part 1910.1001, and 29 CFR Part 1926.1101. Copies of these regulations are included herein by reference and shall be considered as a requirement of these Specifications.
  2. All respirators used shall be selected from those approved by NIOSH for use in atmospheres containing asbestos fibers.
  3. Work activities associated with the removal of asbestos-containing materials (i.e., ceiling tiles) shall be conducted in a minimum of Powered-Air Purifying Respirator (PAPR) respirators with P-100 filters.
- C. Provide workers and authorized visitors with sufficient sets of protective full body impervious protective clothing. Such clothing shall consist of full body coveralls and headgear. Provide eye protection and hard hats as required by applicable safety regulations. Reusable type protective clothing and footwear shall be left in the equipment room until the end of the asbestos abatement work, at which time such items shall be disposed of as asbestos waste or shall be thoroughly cleaned of all asbestos or asbestos-containing material. Disposable type protective clothing, headgear, and footwear may be provided.
- D. Provide and post, in the equipment room and the clean room, the decontamination and work procedures to be followed by workers and authorized visitors as described in these Specifications.
- E. Worker Protection Procedures:
1. Each worker and authorized visitor shall, upon entering the job site, remove street clothes in the clean room and put on a respirator and clean protective clothing before entering the equipment room or the work area.
  2. All workers and authorized visitors shall, each time they leave the work area; remove gross contamination from clothing before leaving the work area; proceed to the equipment room and remove all clothing except respirators; still wearing the respirator proceed to the showers, clean the outside of the respirator with soap and water while showering; remove the respirator; thoroughly shampoo and wash themselves.
  3. Following showering and drying off, each worker and authorized visitor shall proceed directly to the clean room and dress in clean clothes at the end of each day's work, or before eating, smoking, or drinking. Before reentering the work area from the clean room each worker and authorized visitor shall put on a clean respirator and shall dress in clean protective clothing.
  4. Contaminated work footwear shall be stored in the equipment room when not in use in the work area. Upon completion of asbestos abatement, the

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- footwear will either be disposed of as contaminated waste or will be bagged and sealed for use at another abatement project.
5. Workers removing waste containers from the equipment decontamination enclosure shall enter the holding area from outside wearing a respirator and dressed in clean disposable coveralls. No worker shall use this system to leave or enter the washroom or the work area.
  6. Workers shall not eat, drink, smoke, or chew gum or tobacco while in the work area.
  7. Workers shall be fully protected with respirators and protective clothing from the time of first disturbance of asbestos-containing or contaminated materials prior to commencing actual asbestos abatement and until final cleanup is completed.
- F. If contaminated personnel require evacuation of the work area due to an emergency, all work efforts shall stop, and all forces shall be directed at minimizing the area contamination, cleanup operations, and first-aid procedures. These activities shall be noted in the daily logbook.
- G. During work activities requiring decontamination procedures, the Contractor shall provide a means of communication for the workers inside the work area without requiring personnel to enter or leave the work area. The method of communication shall be a two-way radio, localized wire-connected telephone, or similar system. This communication system shall remain intact until the final isolation plastic is removed. Then all equipment shall be wiped down; HEPA vacuumed or disposed of as asbestos-contaminated material.
- H. The Contractor shall provide adequate shower facilities. An employee leaving the work area shall follow all decontamination procedures necessary or as described herein.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. Handling and Storage:
1. Deliver all materials to the project in the original package(s), container(s), or bundle(s) bearing the name of the manufacturer, brand name and the model number.
  2. Store all materials subject to damage off the ground, away from wet or damp surfaces, and under cover sufficient to prevent damage or contamination.

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3. Damaged or deteriorating materials shall not be used and shall be removed from the premises. Material that becomes contaminated with asbestos shall be disposed of in accordance with the applicable regulations.
  - B. Plastic (Polyethylene) Sheeting: Provide 6-mil thickness or greater polyethylene sheeting as specified in sizes to minimize the frequency of joints. Fire retardant polyethylene sheeting is required.
  - C. Tape: Provide two inch or wider duct tape capable of sealing joints of adjacent sheets of polyethylene and for attachment of polyethylene sheets to finished or unfinished surfaces of dissimilar materials. Duct tape shall be capable of adhering under both dry and wet conditions, including use of amended water.
  - D. Spray Cement: Provide aerosol-b a s e d spray cement specifically formulated to stick tenaciously to sheet polyethylene.
  - E. Surfactant: Provide a 50 percent polyoxymethylene ether and 50 percent polyoxymethylene ester, or equivalent and mix with water to provide a concentration of one ounce surfactant to 5 gallons of water.
  - F. Impermeable Containers: Provide impermeable containers suitable to receive and retain any asbestos-containing or contaminated materials until disposal at Disposal Site labeled in accordance with OSHA Regulation 29 CFR 1910.1101, DOT 49 CFR 171-177, Title 8 CCR and SBACPD. Containers must be both air and watertight and must be resistant to damage and rupture. Plastic bags shall be a minimum of 6-mil thick.
  - G. Warning Labels and Signs: Provide warning labels and signs as required by OSHA Regulation 29 CFR Part 1910.1101, Title 8 CCR Part 1529 and SBAPCD Rule 1001.
  - H. Other Materials: Provide all other materials, such as lumber, nails and hardware, which may be required to construct and dismantle the decontamination area and the barriers that isolate the work area.
  - I. Solvents used for the removal of resilient flooring mastics shall be low odor.
- 2.2 TOOLS AND EQUIPMENT
- A. Provide all tools and equipment necessary to perform the required asbestos removal/abatement.
  - B. Air Filtration Equipment: High Efficiency Particulate Air (HEPA) filtration systems shall be equipped with filtration equipment in compliance with ANSI Z9-2-79, local exhaust ventilation. No air movement system or air filtering equipment shall discharge unfiltered air outside the work area. A pressure differential system shall be established in the work area continuously (24 hours per day) from the

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start of the work in the area until the area has been decontaminated and certified as such by the required testing. The system shall produce a minimum of four filtered air changes per hour in the work area and maintain a pressure differential of 0.020-inches water gauge between the inside and outside of the work area. All filtered, exhausted air shall be discharged outside the building away from any building air- intake devices (unless stated otherwise).

- C. Manometer: A continuous recording monitor shall measure and record the difference in air pressure between that inside the work area from that outside the work area. The recording system shall be accurate to the nearest 0.001 inches of water pressure differential and be equipped with an alarm that sounds if the difference becomes less than 0.020-inches water gauge.

**PART 3 - EXECUTION**

**3.1 ASBESTOS REMOVAL PREPARATION PROCEDURES**

- A. General Work Area Preparation: Contractor shall perform the following general work area preparation procedures prior to commencement of any abatement activities:
  - 1. Danger signs meeting the specifications of 29 CFR Part 1926.1101 and 8 CCR 1529 shall be posted at any location and approaches to locations where airborne concentrations of asbestos may exceed ambient background levels. Signs shall be posted at a distance sufficiently far enough away from the work area to permit an employee to read the sign and take the necessary protective measures to reduce or avoid exposure. Additional signs may need to be posted following construction of workplace enclosure barriers. The signs shall be in accordance with Article 1.09.D.2 of this Section.
  - 2. Asbestos handlers shall use personnel protective equipment as required in Article 2.02 of this Section.
  - 3. Contractors shall shut down and lock out electric power to work areas, where necessary, to provide a safe work environment. The contractor shall provide temporary power sources and equipment, including ground faulting, in compliance with all applicable electrical code requirements and Cal-OSHA requirements for temporary electrical systems. The Contractor shall utilize a licensed electrician to perform all electrical power shut down and temporary power installation. All electrical equipment used during the removal of asbestos-containing materials shall be connected to a Ground Fault Interrupted (GFI) circuit.
  - 4. Heating, ventilation, and air-conditioning (HVAC) system components that supply return, or that pass through the work areas shall be shut down and locked out.

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5. The Contractor shall isolate the asbestos removal work areas from other occupied areas of the building. Windows, doorways, corridor entrances, drains, ducts, grilles, grates, diffusers, and any other opening between the work area and areas outside of the work area (including the outside of the building, tunnels, and crawl spaces) shall be critically sealed with two layers of 6-mil polyethylene sheeting and duct tape.
  6. Emergency and fire exit from the work areas shall be maintained and adequately marked. Alternative exits shall be established that are satisfactory to the Consultant and local fire regulations.
  7. Contractor shall construct and maintain at least one three-stage decontamination unit. This decontamination unit shall be constructed in accordance with the requirements set forth in Article 3.02 of this Section. The asbestos worker wash/decontamination station may be used as the lead worker wash/decontamination station.
- B. Floor Tile & Black Mastic Procedures:
1. Two layers of 6-mil plastic sheeting on the walls and ceilings.
  2. Install worker decontamination unit described in Article 3.02 or as agreed upon with the Project Environmental Manager.
  3. A pressure differential system shall be established that produces a minimum of four filtered air changes per hour in the work area and maintains a pressure differential of 0.02-inch water gauge between the inside and outside of the work area. The pressure differential system shall not be exhausted into occupied areas of the building.
  4. Asbestos-containing material shall be sprayed with amended water using spray equipment capable of providing a low-pressure application.
  5. Wetted material shall be manually demolished using hand equipment.
  6. Cleanup shall proceed in accordance with Article 3.08 - Cleanup Procedures.
- C. White Duct Tape Material
1. Floors, walls, and ceiling shall be covered with two layers of 6-mil polyethylene sheeting.
  2. The area around where pipe fitting insulation will be removed using glove bags shall be isolated with a full containment or mini enclosure. The walls or the full containment or the walls of the mini-enclosure shall be constructed with one layer of 6-mil polyethylene sheeting.
  3. Install worker decontamination unit described in Article 3.02 or as agreed upon with the Project Environmental Manager.
  4. A pressure differential system shall be established that produces a minimum of four filtered air changes per hour in the work area and maintains a pressure differential of 0.02-inch water gauge between the inside and outside of the work area. The pressure differential system shall not be exhausted into occupied areas of the building.

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5. Glove bags shall be installed in accordance with the procedures outlined in 29 CFR 1926.1101.

**3.2 WORKER DECONTAMINATION ENCLOSURE SYSTEMS**

- A. At least one worker decontamination enclosure system shall be provided on the site that is easily accessible from each of the asbestos removal work areas. The asbestos worker decontamination enclosure system may also be used for the lead worker decontamination system.
- B. Worker decontamination enclosure systems constructed at the worksite shall utilize 6-mil opaque black or white polyethylene sheeting or other acceptable materials for privacy.
- C. The worker decontamination enclosure system shall consist of at least one clean room, a wash station, and an equipment room, each separated from the other by curtained doorways.
- D. Entry to and exit from all decontamination enclosure system chambers shall be through curtained doorways consisting of two sheets of overlapping polyethylene sheeting. One sheet shall be secured at the top and left side, the other sheet at the top and right side. Both sheets shall have weights attached to the bottom to ensure that they hang straight and maintain a seal over the doorway when not in use. Doorway designs, providing equivalent protection and acceptable to the Consultant, may be utilized.
- E. Pathways into (from clean to contaminated) and out of (contaminated to clean) the work area shall be clearly designated.
- F. The clean room shall be sized to adequately accommodate the work crew. The clean room shall also provide shelves for storing respirators and a location for posting notices.
- G. The wash station shall have water and soap for washing away asbestos contamination. The wash station shall have a drain pan to collect wastewater.
- H. The equipment room shall be used to disrobe washing at the wash station. A drum lined with a labeled 6-mil polyethylene bag for collection of disposable clothing shall be in this room.

**3.3 EMERGENCY EXITS**

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- A. Emergency exits shall be established and clearly marked with duct tape arrows or other effective designations to permit easy identification and location by the workers from anywhere within the work area. Emergency exits shall be secured to prevent access to uncontaminated areas and still permit emergency exiting. Emergency exits shall be properly sealed with 6-mil polyethylene sheeting that can be cut to permit egress, if needed. These exits may be the worker decontamination enclosure, the waste pass-out airlock, and/or other alternative exits satisfactory and in compliance with local fire regulations. Where emergency exits are sealed, an instrument capable of cutting the polyethylene barrier shall be installed on both sides of the barrier, to allow for immediate exit from the work area in the event of an emergency.

**3.4 MAINTENANCE OF WORKPLACE BARRIERS**

- A. Following completion of the construction of polyethylene barriers and decontamination system enclosures, adequate settling time shall be required to ensure that barriers will remain intact and secured to walls and fixtures before beginning actual abatement activities.
- B. Workplace barriers shall be visually inspected at the beginning of each work period or shift by the Supervisor/Competent Person.
- C. Damage and defects in the enclosure system shall be repaired immediately upon discovery. This information shall also be noted in the Contractor's daily log.
- D. At any time during the abatement activities after barriers have been erected, if visible material is observed outside of the work area or if damage occurs to barriers, work shall immediately stop, repairs made to barriers, and debris/residue cleaned up using appropriate HEPA- vacuuming and wet-mopping procedures. This information shall also be noted in the Contractor's daily log.

**3.5 COMMENCEMENT OF WORK SHALL NOT OCCUR UNTIL**

- A. Enclosure systems have been constructed and tested.
- B. At least one three-stage decontamination unit with wash station is operational. This decontamination unit can be the same as the lead-related demolition decontamination unit.
- C. Pressure differential systems are functioning adequately.
- D. Pre-abatement submissions, notifications, and permits have been provided and are satisfactory to the Client's Representative.
- E. Equipment for abatement, cleanup, and disposal are available.

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- F. Worker training, medical examination, and respirator fit testing (and certification) is completed, or applicable, current documentation of this information is provided. This information shall also be provided for new workers on the first day they arrive at the work site.
- G. Glove bags have been smoked tested.
- H. Contractor receives permission from the Consultant to commence asbestos-related demolition work.

**3.6 WORKPLACE ENTRY AND EXIT PROCEDURES**

- A. General: The following procedures shall be followed prior to entrance into any regulated asbestos work area:
  - 1. Personnel who enter the work area shall sign the entry log upon entry and exit.
  - 2. Personnel, before entering the work area, shall read and be familiar with posted regulations, personal protection requirements (including workplace entry and exit procedures), and emergency procedures.
  - 3. Personnel shall wear appropriate respiratory protection and disposable coveralls, head covering, and foot covering. Hardhats, eye protection, and gloves shall also be utilized, as required. Clean respirator filter cartridges and protective clothing shall be provided and utilized by each person for each separate entry into the work area.
  - 4. Personnel wearing designated personal protective equipment shall proceed to the work area.
  - 5. To exit the work area, personnel shall proceed to the equipment room where they shall remove protective equipment, except respirators, and deposit disposable clothing into appropriately labeled containers for disposal.
  - 6. Clothing or footwear worn in a regulated work area will not be permitted out of the regulated work area.
  - 7. Reusable, contaminated footwear shall be stored in the equipment room when not in use in the work area. Upon completion of abatement, it shall be disposed of as asbestos- contaminated waste. (Rubber boots may be decontaminated at the completion of the abatement for reuse).
- B. Floor Tile, Black Mastic, White Duct Tape material, and Glove Bag Removal Work Area Entry and Exit Procedures:
  - 1. Asbestos handlers involved in ceiling tile and glove bag removal procedures shall wear two disposable suits appropriate for the work, including gloves, hood and footwear, and appropriate respiratory protective equipment. Hard hats, eye protection, and gloves shall also be utilized as required. Clean

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respirators and protective clothing shall be provided and utilized by each person for each separate entry into the work area.

2. The double layer personal protective equipment shall be used throughout the procedure if a decontamination unit with a shower room is not contiguous to the work area. Upon exiting the work area and entering the change room, the worker shall HEPA vacuum and wet clean the outer suit and dispose of it as asbestos-contaminated waste. Workers shall then proceed to an operational three-stage decontamination unit to remove and dispose of the second suit, shower, and change into street clothes.

**3.7 ASBESTOS-CONTAINING MATERIAL REMOVAL PROCEDURES**

**A. General**

1. The work area shall be cleaned and isolated in accordance with the procedures set forth in Article 3.01 of this Section.
2. Waste containers for floor tile and mastic and roofing material shall be sealed when full. Bags shall not be overfilled. Bags shall be securely sealed to prevent accidental opening and leakage by tying the tops of bags in an overhand knot or by taping in gooseneck fashion. Bags shall not be sealed with wire or cord.

**B. Floor Tile and Black Mastic Removal Procedures:**

1. Asbestos-containing floor tile and black mastic shall be sprayed with amended water, using spray equipment capable of providing a low-pressure application.
2. Wetted asbestos containing floor tile & black mastic shall be removed using methods to minimize the breakup of the material such as manual scrapers. The floor tile and black mastic shall not be rendered friable during the removal. Waste materials shall immediately be packed in 6-mil, properly labeled, plastic bags as it is removed. Material shall not be allowed to drop to the floor. The waste bags shall then be placed in labeled containers for transport. Material shall not be allowed to dry out prior to insertion into the container.
3. In lieu of removing the floor tile and black mastic from the floor substrate, the floor assembly may be removed with the floor tile black mastic still adhered. The flooring waste shall immediately be placed into 6-mil plastic bags.
4. Cleanup shall proceed in accordance with Article 3.08 - Cleanup Procedures.
5. After the work area surfaces have been rendered free of visible residues, a thin coat of an approved encapsulating agent shall be applied to seal in nonvisible residue.
6. Dispose of all asbestos containing/contaminated waste in accordance with Article 3.10 - Disposal Procedures.

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C. White Duct Tape Material Removal Procedures:

1. Glove bags shall be installed so that they completely cover the piping and other structures where asbestos work is to be done. Glove bags shall be installed by cutting the sides of the glove bag to fit the size of pipe or opening from which asbestos is to be removed. The glove bag is attached to the pipe by folding the open edges together and securely sealing them with tape. All openings in the glove bag must be sealed with duct tape or equivalent material. The bottom seam of the glove bag must also be sealed with duct tape or equivalent to prevent any leakage from the bag that may result from a defect in the bottom seam.
2. Asbestos-containing pipe insulation shall be thoroughly wet with amended water.
3. Asbestos-containing White Duct Tape material contained within the glove bag shall be removed manually, utilizing appropriate hand tools.
4. The removed asbestos waste and other structures that have fallen into the enclosed bag must be maintained in a wet state.
5. After removal of the asbestos-containing White Duct Tape material, the piping/duct, and other structures from which the asbestos has been removed must be thoroughly cleaned with a polyethylene brush and wet wiped until no traces of asbestos debris can be seen. Non- asbestos white duct material, if present, must be cut back a minimum of three inches from where it encounters any asbestos-containing material.
6. When the asbestos removal and encapsulation have been completed, a vacuum hose from a HEPA-filtered vacuum must be inserted into the glove bag through the appropriate port to remove any air in the bag that may contain asbestos fibers. When the air has been removed from the bag, the bag should be squeezed tightly (as close to the top as possible), twisted, and sealed with dust tape to keep the asbestos-containing materials safely in the bottom of the bag. The HEPA vacuum can then be removed from the bag, and the glove bag itself can be removed from the work area to be disposed of properly.
7. After the work area surfaces have been rendered free of visible residues, a thin coat of a satisfactory encapsulating agent shall be applied to seal in nonvisible residue.
8. Cleanup shall proceed in accordance with Article 3.08 - Cleanup Procedures.
9. Dispose of all asbestos containing/contaminated White Duct Tape material OR duct/pipe fitting waste as hazardous waste in accordance with Article 3.10 - Disposal Procedures.

3.8 CLEANUP PROCEDURES

A. General

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1. Visible accumulations of ACM and asbestos-contaminated debris shall be removed and containerized utilizing nonmetallic tools (squeegees, shovels, and the like). Surfaces in the work area shall then be wet cleaned. Equipment used in the work area shall be included in the cleanup and shall be removed from work areas via the decontamination enclosure system or waste load-out, at appropriate times in the cleaning sequence.
  2. None of the procedures described in this Article relieve the Contractor of the responsibility to meet the final clearance criteria as established by this Section.
- B. Floor Tile and Black Mastic Removal Cleanup Procedures:
1. The windows, doors, and HVAC vents shall remain sealed, and any HEPA-filtered pressure differential systems, waste load-out, and decontamination enclosure systems shall remain in service.
  2. The work area and other contaminated areas shall be cleaned utilizing HEPA-filtered vacuum equipment and wet-wiping techniques. After completion of the cleaning operation, a complete visual inspection of the work shall be conducted with the Consultant to ensure that the work area is free of visible asbestos debris. A final check shall be made for asbestos debris, and further cleaning will be conducted, as necessary. The Consultant shall be notified 24 hours in advance of the requirement for a visual inspection.
  3. Upon completion of the cleaning operation, Contractor shall notify the Consultant that the negative pressure enclosure work areas are ready for review and clearance air monitoring. The negative pressure enclosure areas shall be cleaned until they pass the Clearance Air Monitoring Standard. The Consultant will require up to one 8-hour shift to complete clearance air monitoring following successful completion of the visual inspection.
  4. Upon notification from the Consultant that the negative pressure enclosure work area has passed the standard for clearance air monitoring, the Contractor shall remove remaining polyethylene sheeting, isolation and/or critical barriers, decontamination unit, dismantle negative air pressure devices, and remove asbestos warning signs/ribbon.
- C. White Duct Tape Material Removal Clean Up Procedures:
1. All critical barriers shall remain sealed, and any HEPA-filtered pressure differential systems, waste load-out, and decontamination enclosure systems shall remain in service.
  2. The work area and other contaminated areas shall be cleaned utilizing HEPA-filtered vacuum equipment and wet-wiping techniques. After completion of the cleaning operation, a complete visual inspection of the work shall be

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conducted with the Consultant to ensure that the work area is free of visible asbestos debris. A final check shall be made for asbestos debris, and further cleaning will be conducted, as necessary. The Consultant shall be notified 24 hours in advance of the requirement for a visual inspection.

**3.9 CLEARANCE AIR MONITORING**

- A. The following clearance air monitoring procedures will be used in negative pressure enclosure work areas.
1. After completion of cleanup operations, Contractor shall notify the Consultant that the work areas are ready for clearance air monitoring. Notification shall be a minimum of 24 hours prior to the need for clearance air monitoring. Final clearance air monitoring shall be conducted only after the procedures set forth in Article 3.08 of this Section have been completed, the area has been satisfactorily cleaned and encapsulated, and the abatement area has been thoroughly dried.
  2. The Consultant shall conduct the final clearance air monitoring by collecting and analyzing a minimum of two air samples per work area utilizing the methods set forth in NIOSH Method 7400. Clearance air monitoring may require up to one work shift to complete. The Consultant, at its discretion, may perform aggressive clearance air monitoring including blowing the area with a leaf blower and running fans while the air sampling pumps are running.
  3. Clearance of a work area shall be achieved when each sample taken within the contained work area indicates airborne fiber concentrations of less than 0.01 fibers per cubic centimeter, as determined by phase contrast microscopy.
  4. Abatement areas not achieving clearance shall be recleaned using procedures set forth in Article 3.08 of this Section, and retested until clearance is achieved. The cost of additional samples, consultant air monitoring fees, and labor for re-cleaning the work areas that fail final air clearances shall be paid for by the Contractor.

**3.10 DISPOSAL PROCEDURES – HAZARDOUS WASTE**

- A. As the work progresses, to prevent exceeding available storage capacity on site, sealed and labeled containers of asbestos-containing waste shall be removed and transported to the prearranged disposal location.
- B. Unless other arrangements are made satisfactory to the Consultant, bagged, or wrapped material shall be removed from the work areas and placed in a Contractor-supplied dumpster a minimum of every day. The dumpster shall be marked with asbestos warning signs and be always locked when not in use. When a dumpster is full, it shall be removed from consultant property by the end of the next business day.

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- C. Disposal shall occur at an authorized site, in accordance with regulatory requirements of NESHAPs and applicable state and local guidelines and regulations, including the California State Department of Health Services, Toxic Substances Control Division.
- D. Uniform hazardous waste manifests, dump receipts; trip tickets, transportation manifests, or other documentation of disposal shall be delivered to the Consultant Representative for their records.

**3.11 OSHA PERSONNEL AIR MONITORING**

- A. Air monitoring required by OSHA for asbestos exposure determination is the work of the contractor. The contractor is responsible for providing daily OSHA compliance monitoring as per 8 CCR 1529 and 29 CFR 1926.1101.
  - 1. At minimum, Contractor shall conduct representative (25% of crew) breathing zone personal air monitoring of its employees twice each shift and repeated daily.
  - 2. Monitoring shall be conducted by a qualified air professional experienced and knowledgeable about the methods of air monitoring and in accordance with 8 CCR 1529 and CFR 1926.1101.
  - 3. Monitoring results and appropriate laboratory analysis work shall be submitted to the Consultant within twenty-four (24) hours of the monitoring work.

**3.12 ALTERNATE PROCEDURES**

- A. The procedures described in this Section shall always be utilized.
- B. If specified procedures cannot be utilized, a request shall be made in writing to the Consultant providing details of the problem encountered and proposed alternatives.
- C. Alternative procedures shall provide equivalent or greater protection than the procedures that they replace.
- D. Alternative procedure shall be approved in writing by the Consultant prior to implementation.

END OF SECTION

**SECTION 03 10 00**  
**CONCRETE FORMING AND ACCESSORIES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes
  - 1. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
  - 2. Openings for other work.
  - 3. Form accessories.
  - 4. Form stripping.
  
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
  
- C. Related Sections:
  - 1. Section 033000 - Cast-in-Place Concrete: Supply of concrete accessories for placement by this section.

**1.2 REFERENCES**

- A. American Concrete Institute (ACI):
  - 1. ACI 301 - Structural Concrete for Buildings.
  - 2. ACI 318 - Building Code Requirements for Reinforced Concrete.
  - 3. ACI 347 - Recommended Practice For Concrete Formwork.
  
- B. United States Department of Commerce Product Standard (PS):
  - 1. PS 1 - Construction and Industrial Plywood.

**1.3 SUBMITTALS**

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
  - 1. Product Data: Provide data on void form materials and installation requirements. Submit data on form-coating materials.
  - 2. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.

**1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with ACI 347.

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**SECTION 03 10 00**  
**CONCRETE FORMING AND ACCESSORIES**

- B. Where necessary, design formwork under direct supervision of a Professional Engineer experienced in design of formwork and licensed in a State where Project is located at no additional cost to the County.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect products.
- B. Deliver void forms and installation instructions in manufacturer's packaging.
- C. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Environmental Impact:
  - 1. Formwork: Reuse forms to greatest extent possible without damaging structural integrity of concrete and without damaging aesthetics of exposed concrete.

PART 2 - PRODUCTS

2.1 WOOD FORMS

- A. Forms for Exposed Finish Concrete: Plywood panels, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.
  - 1. Plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for a tight fit.
- C. Lumber: Construction grade; with grade stamp clearly visible.

2.2 PREFABRICATED FORMS

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**SECTION 03 10 00  
CONCRETE FORMING AND ACCESSORIES**

- A. Preformed Steel Forms: Minimum 16 gage, well matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- B. Void Forms (Carton Forms): Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set. Thickness indicated on drawings.
- C. Tubular Column Type: Metal or fiberglass-reinforced plastic. Provide units with sufficient wall thickness to resist wet concrete loads without deformation.

**2.3 ACCESSORIES**

- A. Form Ties: Factory-fabricated, removable or snap-off type, metal, of fixed or adjustable length as applicable, with cone ends. Designed to prevent form deflection and to prevent spalling concrete upon removal. Back break dimension, 1-1/2 inch from exposed concrete surface. Provide ties that, when removed, will leave holes not larger than 1 inch diameter in concrete surface.
- B. Form Release Agent: 100 percent biodegradable colorless agent which will not stain concrete, absorb moisture, or impair natural bonding or color characteristics of subsequent coatings intended for use on concrete surfaces. Zero VOC.
  - 1. Envirolux by Conspec,
  - 2. SMD-10 Soy Form Release by Strategic Market Development
  - 3. Bio-Form by Leahy-Wolf,
  - 4. Or equal as permitted in Section 016000 - Product Requirements: Product options and substitutions.
- C. Corners: Chamfered, wood strip 3/4 x 3/4 inch size; maximum possible lengths.
- D. Dovetail Anchor Slot: Galvanized steel, 22 gage thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- E. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
- F. Waterstops (Rubber/PVC): Rubber or Polyvinyl chloride, minimum 1,750 tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, width as indicated on Drawings, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.

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**SECTION 03 10 00**  
**CONCRETE FORMING AND ACCESSORIES**

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Install Section 017300 – Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, and conditions are as required, and ready to receive Work.
  - 1. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Drawings.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected and approved by the Engineer.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to County.

**3.2 EARTH FORMS**

- A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

**3.3 FORMWORK INSTALLATION**

- A. Install formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 347R.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Furnish in largest available sizes to minimize number of joints and to conform to joint system indicated on Drawings.
- E. Obtain the Engineer's approval before framing openings in structural members which are not indicated on Drawings.
- F. Provide chamfer strips on external corners of concrete members, to produce uniform, smooth lines and tight edge joints.

03 10 00 - 4

**SECTION 03 10 00**  
**CONCRETE FORMING AND ACCESSORIES**

- G. Install void forms in accordance with manufacturer's published instructions. Protect forms from moisture or crushing.

**3.4 FORM RELEASE AGENT APPLICATION**

- A. Apply form release agent on formwork in accordance with manufacturer's published instructions.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

**3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS**

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate and set in place items which will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
- D. Install accessories in accordance with manufacturer's published instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- F. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.
- G. Install waterstops in accordance with manufacturer's published instructions continuously without displacing reinforcement. Seal joints watertight.

**3.6 FORM CLEANING**

03 10 00 - 5

**SECTION 03 10 00  
CONCRETE FORMING AND ACCESSORIES**

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

**3.7 CONSTRUCTION**

- A. Site Tolerances:
  - 1. Construct formwork to maintain tolerances required by ACI 301 and ACI 347.
  - 2. Camber slabs and beams 1/4 inch per 10 feet in accordance with ACI 301.

**3.8 FIELD QUALITY CONTROL**

- A. Section 014000 - Quality Requirements: Field inspection and testing.
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

**3.9 FORM REMOVAL**

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

**END OF SECTION**

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**SECTION 03 20 00  
CONCRETE REINFORCING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Reinforcing steel bars.
  - 2. Reinforcement accessories.
- B. Related Documents: The Contract Documents, as defined in Section 01110 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
  - 1. Section 03 10 00 - Concrete Forming and Accessories: Coordination between formwork and reinforcing.
  - 2. Section 03 30 00 - Cast-in-Place Concrete: Coordination between concrete placement and reinforcing.

**1.2 REFERENCES**

- A. American Concrete Institute (ACI):
  - 1. ACI 301 - Structural Concrete for Buildings.
  - 2. ACI 318 - Building Code Requirements for Reinforced Concrete.
  - 3. ACI SP-66 - American Concrete Institute - Detailing Manual.
- B. American Society for Testing and Materials (ASTM):
  - 1. ASTM A 184 - Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
  - 2. ASTM A 615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
  - 3. ASTM A 704 - Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.
- C. American Welding Society (AWS):
  - 1. AWS D1.4 - Structural Welding Code for Reinforcing Steel.
- D. Concrete Reinforcing Steel Institute (CRSI):
  - 1. CRSI - Manual of Practice.
  - 2. CRSI 63 - Recommended Practice for Placing Reinforcing Bars.
  - 3. CRSI 65 - Recommended Practice for Placing Bar Supports, Specifications and Nomenclature.

03 20 00 - 1

**SECTION 03 20 00  
CONCRETE REINFORCING**

**1.3 SUBMITTALS**

- A. Section 01 33 23 - Shop Drawings, Product Data and Samples: Procedures for submittals.
  - 1. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and bending and cutting schedules and supporting and spacing device. Include special reinforcement required for openings through concrete structures.
  - 2. Assurance/Control Submittals.
    - a. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
    - b. Submit certified copies of mill test report of reinforcement materials analysis.
    - c. Welder's Certificates.

**1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with CRSI 63, 65 and Manual of Practice ACI 301, ACI SP-66, ACI 318, and ASTM A 184.
- B. Design reinforcement under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State where the Project is located.
- C. Welders' Certificates: Submit certificate, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

**PART 2 - PRODUCTS**

**2.1 STEEL REINFORCEMENT**

- A. Reinforcing Steel: ASTM A 615, 60 ksi yield grade; deformed billet steel bars, unfinished.
- B. Reinforcing Steel Mat: ASTM A 704, ASTM A 615, 60 ksi yield grade; steel bars or rods, unfinished.
- C. Reinforcing Steel Mesh: ASTM A185; 6X6, w 1.4 X w 1.4.

03 20 00 - 2

**SECTION 03 20 00  
CONCRETE REINFORCING**

**2.2 ACCESSORIES**

- A. Tie Wire: Minimum 16 gage annealed type.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture.
- C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel type (CRSI, Class 1) or stainless steel protected (CRSI, Class 2); size and shape as required.

**2.3 FABRICATION**

- A. Fabricate concrete reinforcing in accordance with ACI SP-66 and ACI 318.
- B. Weld reinforcement in accordance with AWS D1.4.
- C. Locate reinforcing splices not indicated on drawings, at point of minimum stress. Review location of splices with Project Manager.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Verification of Conditions: Verify that field measurements, surfaces, and conditions are as required, and ready to receive Work.
- B. Report in writing to Project Manager prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

**3.2 PLACEMENT**

- A. Place, support, and secure reinforcement against displacement. Do not deviate from the required position.

03 20 00 - 3

**SECTION 03 20 00  
CONCRETE REINFORCING**

- B. Do not displace or damage vapor barrier.
- C. Accommodate placement of formed openings.
- D. Maintain concrete cover around reinforcing in accordance with ACI 318.

**3.3 FIELD QUALITY CONTROL**

- A. Section 01450 - Quality Control: Field inspection.
- B. Inspect reinforcing locations, bar types and sizes, wire ties, and welding (if applicable).

END OF SECTION

NOT FOR BID

03 20 00 - 4

**SECTION 03 2000  
CONCRETE REINFORCEMENT**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Reinforcing steel bars.
  - 2. Reinforcement accessories.
  
- B. Related Documents: The Contract Documents, as defined in Division 1 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
  
- C. Related Sections:
  - 1. Section 03 3000 - Cast-in-Place Concrete: Coordination between concrete placement and reinforcing.

**1.2 REFERENCES**

- A. American Concrete Institute (ACI):
  - 1. ACI 301 - Structural Concrete for Buildings.
  - 2. ACI 318 - Building Code Requirements for Reinforced Concrete.
  - 3. ACI SP-66 - American Concrete Institute - Detailing Manual.
  
- B. American Society for Testing and Materials (ASTM):
  - 1. ASTM A 184 - Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
  - 2. ASTM A 615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
  - 3. ASTM A 704 - Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.
  
- C. American Welding Society (AWS):
  - 1. AWS D 1.4 – Structural Welding Code for Reinforcing Steel.
  
- D. Concrete Reinforcing Steel Institute (CRSI):
  - 1. CRSI - Manual of Practice.
  - 2. CRSI 63 - Recommended Practice for Placing Reinforcing Bars.
  - 3. CRSI 65 - Recommended Practice for Placing Bar Supports, Specifications and Nomenclature.

**SECTION 03 2000  
CONCRETE REINFORCEMENT**

**1.3 SUBMITTALS**

**A. Submittal Procedures:**

1. Shop Drawings: Indicate bar sizes, spacing's, locations, and quantities of reinforcing steel [and wire fabric, bending and cutting schedules, and supporting and spacing device. Include special reinforcement required for openings through concrete structures.
2. Assurance/Control Submittals.
  - a. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
  - b. Submit certified copies of mill test report of reinforcement materials analysis.
3. Weld Procedure Specifications: Provide for bars to be welded in accordance with AWS D1.4-11.
4. All WPS's shall be submitted to the Structural Engineer of Record (SEOR) for review and approval prior to use.
5. For WPS's that have been qualified by test, the supporting Procedure Qualification Record (PQR) shall be submitted to the Engineer for review and approval.

**1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with CRSI 63, 65 and Manual of Practice ACI 301, ACI SP-66, ACI 318, and ASTM A 184.
- B. Reinforcement design is provided by the Structural Engineer of Record, experienced in design of this work and licensed in the State where the Project is located.
- C. Source Quality Control: Testing Laboratory shall perform following conformance testing, shall select test samples of bars, ties, and stirrups from the material at the site or from place of distribution, each sampling including at least two 18" long pieces, and perform the following tests in accordance with ASTM A706.
- D. Identified Bars: If samples are obtained from bundles as delivered from the mill, identified as to heat number, accompanied by mill analyses and mill testreports, and properly tagged with Identification Certificate to be readily identified, perform one tensile and one bend test for each 10 tons or fraction thereof of each size of bars. Submit mill reports when samples are selected.
- E. Unidentified Bars: When positive identification of reinforcing bars cannot be made and when random samples are obtained; perform tests for each 2.5 tons or fraction thereof, one tensile and one bend test from each size of bars.
- F. Certification of Welders: All welding both in shop and in field shall be performed by certified welding operators per AWS D1.4.

**SECTION 03 2000  
CONCRETE REINFORCEMENT**

1.5 DELIVERY, STORAGE AND HANDLING

- A. Comply with pertinent provisions of Division 01 Section 01 6000 "Product Requirements," delivering materials in a timely manner to ensure uninterrupted progress.
- B. Bundle bars, tag with identification and transport and store so as not to damage any material. Use metal tags indicating size, length and other marking shown on placement drawings. Maintain tags after bundles are broken.

1.6 EXTRA MATERIAL:

- A. Provide an allowance of an additional 10% of the total reinforcing steel tonnage in addition to quantities shown on drawings. This additional steel shall be installed at the discretion of, and in the locations directed by the Structural Engineer. The proposal will need to be provided with unit prices too. Provide unit price for the purpose of adjusting contract price to reflect quantity of extra material used. All unused material shall be credited to the owner based upon the agreed unit prices.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide reinforcing of sizes, gages and lengths indicated, bent to indicated shapes.

2.2 STEEL REINFORCEMENT MATERIALS

- A. Reinforcing Steel: ASTM A 706, 60 ksi yield grade; deformed billet steel bars, unfinished as indicated on the drawings.
- B. Reinforcing bars for welding: ASTM A706, Grade 60.
- C. Reinforcing mesh: ASTM A185, mesh size and gauge as shown 60 ksi minimum tensile strength. Provide mesh in flat sheets only.
- D. Tie wire: ASTM A82, Annealed copper-bearing steel, 16 gauge minimum.
- E. Chairs and similar support items:
  - 1. Standard manufactured products conforming to Concrete Reinforcing Steel Institute, "Manual of Standard Practice", latest edition.
- F. Use dense precast concrete supports with embedded wire ties for reinforcement placed on grade. Elsewhere, use wire bar supports.
- G. Welding electrodes: AWS D1.4-11, Table 5.1 and Table 5.3, low hydrogen electrodes, E8018 for A706 Grade 60 steel.

**SECTION 03 2000  
CONCRETE REINFORCEMENT**

**2.3 ACCESSORIES**

- A. Tie Wire: Minimum 16 gage annealed type.
- B. Chairs, Bolsters, Bar Supports, and Spacers: Sized and shaped for strength and support reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture.
- C. Special Chairs, Bolsters, Bar Supports, and Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel type (CRSI, Class 1) or stainless steel protected (CRSI, Class 2); size and shape as required.

**2.4 FABRICATION**

- A. Comply with Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice", latest edition, for fabrication of reinforcing steel.
- B. Bending and Forming: Fabricate bars of the indicated sizes and bend and form to required shapes and lengths by methods not injurious to materials. Do not heat reinforcement for bending. Bend bars No. 6 size and larger in the shop only. Bars with unscheduled kinks or bends are subject to rejection. Use only tested and approved bar materials.
- C. Welding: Use only ASTM A706 steel where welding is proposed. Perform welding, where shown or approved, by the direct electric arc process in accordance with AWS D1.4-11 using specified low-hydrogen electrodes. Preheat 6" each side of joint. Protect joints from drafts during the cooling process; accelerated cooling is prohibited. Do not tack weld bars. Welding shall not be done on or within two bar diameters of any bend portion of the bar that has been bent cold. Welding of crossing bars shall not be permitted for assemble of reinforcement unless authorized by the Engineer. Clean metal surfaces to be welded of all loose scale and foreign material. Clean welds each time electrode is changed, and chip burned edges before placing welds. When wire brushed, the completed welds must exhibit uniform section, smooth welded metal, feather edges without undercuts or overlays, freedom from porosity and clinkers, and good fusion and penetration into the base metal. Cut out welds or parts of welds found defective with chisel and replace with proper welding. Fillet welds may be considered prequalified per AWS D1.4, section 6.1.2. Other welds are to be qualified per AWS D1.4, section 6.1. 2.. Where ASTM A615 steel is to be used or occurs in existing elements and is to be welded, complete chemical analyses shall be performed to determine chemical composition and, for new bar, provided in the mill certifications to determine weldability in accordance with ACI 318 Section 3.5.2 with modifications per AWS D1.4. The carbon equivalency (CE) shall be clearly defined and bars with a CE above 0.75 shall not be welded.

**SECTION 03 2000  
CONCRETE REINFORCEMENT**

Welding Procedure Specifications and supporting Procedure Qualification Records with required testing per AWS D1.4, shall be provided for review and approval prior to welding. These WPS's and PQR's shall be specific to the CE as determined above, and shall, in addition to the other AWS requirements, include minimum and maximum preheat and interpass temperatures that are specific to the CE. This preheat and interpass temperature shall be strictly enforced in the field. If separate shipments of bars vary the weldability, the process listed in the requirements above shall be repeated for these new bars.

- D. Prequalification of welds shall be in accordance with AWS D1.4.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Verification of Conditions: Verify that field measurements, surfaces, and conditions are as required, and ready to receive Work.
- B. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the County.

**3.2 INSTALLATION**

- A. Bars shall be bent cold. Bars partially embedded in concrete shall not be field bent except as indicated on reviewed Shop Drawings.
- B. Before installation and just prior to placing concrete, clean reinforcing of loose scale, rust, oil, dirt and any coating that could reduce bond.
- C. Accurate position, install, and secure reinforcing to prevent displacement during the placement of concrete.
- D. Do not displace or damage vapor barrier.
- E. Provide metal chairs to hold reinforcement the required distance above form bottoms. In beams and slab construction, provide chairs under top slab reinforcement as well as under bottom reinforcement. Space chairs so that reinforcement will not be displaced during installation. Provide metal spacers to secure proper spacing. Stirrups shall be accurately and securely wired to bars at both top and bottom. Slabs, footings, and beams in contact with earth provide concrete blocks to support reinforcement at required distance above grade.

**SECTION 03 2000  
CONCRETE REINFORCEMENT**

- F. Install and secure reinforcement to maintain required clearance between parallel bars and between bars and forms. Lapped splices shall be installed wherever possible in a manner to provide required clearance between sets of bars. Stagger lapped splices. Dowels and bars extending through construction joints shall be secured in position against displacement before concrete is installed and subsequently cleaned of concrete encrustations while they are still soft.
- G. Do not install reinforcing in supported slabs and beams until walls and columns have been installed to underside of slabs and beams or until construction joints have been thoroughly cleaned. Reinforcing shall be inspected before placement of concrete and cleaned as required.
- H. Use deformed bars unless otherwise indicated, except for spiral reinforcement.
- I. Maintain concrete cover around reinforcing in accordance with ACI 318.

**3.3 FIELD QUALITY CONTROL**

- D. Section 01 40 00 - Quality Requirements: Field inspection.
- E. Inspect reinforcing locations, bar types and sizes, wire ties, and welding (if applicable).

**3.4 CLEAN UP**

- A. Remove rubbish, debris and waste materials and legally dispose of them off the Project site.

**3.5 PROTECTION**

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

**SECTION 0 3000  
CAST-IN-PLACE CONCRETE**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Includes all labor, materials and appliances, and perform all operations in connection with the installation of Concrete Work, and all related work incidental to the completion thereof, as shown on the drawings, complete, in strict accordance with the drawings and as specified herein. Section Includes:
1. Cast-in-place (CIP) concrete in building.
  2. Finishing of concrete floor slabs and toppings. Concrete liquid surface treatment, sealer, and slip-resistant coatings.
  3. Expansion and contraction, control joints in CIP concrete.
  4. Concrete curing and protection.
- B. Related Documents: The Contract Documents, as defined in Division 1 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents and References in Section 1.2.
- C. Related Sections: Related work specified elsewhere includes but may not be limited to
1. Section 03 2000 - Concrete Reinforcement.

**1.2 REFERENCES**

- A. General:
1. The publications listed below form a part of this specification to the extent referenced.
  2. For reference standards, the latest edition available on the date of Notice Inviting Bids shall be used.
- B. Unless otherwise shown or specified, the work shall conform to the following standards and recommendations of the American Concrete Institute (ACI), latest editions adopted:
1. ACI 117, "Standard Specification for Tolerances for Concrete Construction and Materials."
  2. ACI 121R, "Quality Assurance Systems for Concrete Construction."
  3. ACI211.1, "Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete."
  4. ACI 212.2R, "Guide for Use of Admixtures in Concrete."

**SECTION 0 3000**  
**CAST-IN-PLACE CONCRETE**

5. ACI 214, "Recommended Practice for Evaluation of Strength Test Results of Concrete."
  6. ACI 301, "Specification for Structure /Concrete."
  7. ACI 302.1R, "Guide for Concrete Floor and Slab Construction."
  8. ACI 304R, "Guide for Measuring, Mixing, Transporting, and Placing Concrete."
  9. ACI 304.2-R, "Placing Concrete by Pumping Methods."
  10. ACI 305, "Hot Weather Concreting."
  11. ACI 306, "Cold Weather Concreting."
  12. ACI 306.1 "Standard Specification for Cold Weather Concreting."
  13. ACI 308, "Standard Practice for Curing Concrete."
  14. ACI 309R, "Guide for Consolidation for Concrete."
  15. ACI 315, "Details and Detailing of Concrete Reinforcement."
  16. ACI 318, "Building Code Requirements for Structural Concrete."
  17. ACI 347, "Guide to Formwork for Concrete."
  18. ACI 347.2R "Guide for Shoring/Reshoring of Concrete Multistory Buildings."
  19. ACI 503.2, "Standard Specification for Bonding Plastic Concrete to Hardened Concrete with a Multi-Component Epoxy Adhesive."
  20. ACI SP-15, "Field Reference Manual" which includes ACI 301 "Specifications for Structural Concrete for Buildings" and reference standards specified therein.
- C. American Welding Society (AWS)
1. AWS D1.4, "Structural Welding Code Reinforcing."
- D. American Society for Testing and Materials (ASTM).
1. ASTM A615, "Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement."
  2. ASTM C31, "Standard Practice for Making and Curing Concrete Test Specimens in the Field."
  3. ASTM C33, "Standard Specification for Concrete Aggregates."
  4. ASTM C39, "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens."
  5. ASTM C42, "Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete."
  6. ASTM C94, "Standard Specification for Ready-Mixed Concrete."
  7. ASTM C109, "Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)"
  8. ASTM C114, "Standard Test Method for Chemical Analysis of Hydraulic Cement."
  9. ASTM C138, "Standard Test Method for Unit Weight, Yield, and Air Content of Concrete (Gravimetric) of Concrete."
  10. ASTM C143, "Standard Test Method for Slump of Hydraulic Cement-Cement Concrete."
  11. ASTM C150, "Standard Specification for Portland Cement."

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12. ASTM C156, "Standard Test Method for Water Retention by Concrete Curing Materials."
  13. ASTM C171, "Standard Specification for Sheet Materials for Curing Concrete."
  14. ASTM C173, "Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method."
  15. ASTM C231, "Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method."
  16. ASTM C260, "Standard Specification for Air Entraining Admixtures for Concrete."
  17. ASTM C309, "Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete."
  18. ASTM C311, "Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete."
  19. ASTM C387, "Standard Specification for Packaged, Dry, Combined Materials for Mortars and Concrete."
  20. ASTM C457, "Standard Test Method for Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete."
  21. ASTM C494, "Standard Specification for Chemical Admixtures for Concrete."
  22. ASTM C618, "Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete."
  23. ASTM C920, "Standard Specification for Elastomeric Joint Sealants."
  24. ASTM C685, "Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing."
  25. ASTM C989, "Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars."
  26. ASTM C1260, "Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)."
  27. ASTM C1567, "Standard Test Method for Potential Alkali Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)."
  28. ASTM E154, "Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Slabs, On Walls, or as Ground Cover."
  29. ASTM E1155, "Standard Test Method for Determining Floor Flatness and FL Floor Levelness Numbers"
  30. ASTM D2240, "Standard Test Method for Rubber Property-Durometer Hardness."
- E. Concrete Reinforcing Steel Institute (CRSI),
1. CRSI "Manual of Standard Practice."

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1.3 SUBMITTALS

A. Submittal Procedures: Procedures for submittals.

1. Review of submittals will cover general design only. In no case shall submittal review relieve the Contractor of the responsibility for strength of concrete, general or detailed dimension, quality or quantity of materials, or any other conditions, functions, performance or guarantees required.
2. Product Data:
  - a. Manufacturers' literature containing product and installation specifications and details.
  - b. Where Manufacturer's specifications, recommendations, and/or directions are required in this specification, deliver to the Engineer two (2) copies of such printed specifications, recommendations, and/or directions for approval before any work is commenced.
  - c. Sources of fine and coarse aggregate. Once approved, the source of fine and coarse aggregate shall not be changed without written approval of the Engineer.
  - d. List of manufacturers and brand names for cement, mineral and liquid admixtures, bond breakers, curing compounds, joint sealants, and materials other than aggregates and reinforcing steel. Include product data sheets, instructions, and specifications for use.
3. Batch Plant Equipment and Procedures
  - a. Supplier of concrete and ready-mix grout. Only one source will be approved for the Contractor, including all subcontractors. All concrete and ready-mixed grout supplied to the project shall originate from the approved single facility.
  - b. The following information shall be submitted:
    - 1) Name of supplier.
    - 2) Plant location.
    - 3) Plant volume and output capacity.
    - 4) Capacity of transit equipment.
    - 5) Estimated travel time from plant to jobsite.
  - c. If the Contractor elects to use an on-site concrete batching plant, the following information shall be submitted:
    - 1) Drawings and data including proposed location of the batch plant on the site.
    - 2) List of and performance data for material handling equipment.
    - 3) Procedures for processing, handling, transporting, sorting, and proportioning the materials for concrete.
  - d. All other data necessary to show the supplier's capability to produce concrete of the quality and quantity required.
4. Concrete Procedures
  - a. The following information shall be submitted:

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- 1) Placement drawings for slab-on-grade shall be submitted indicating location and size, placement sequence, joint locations, and embedded items.
  - 2) Procedure for mixing and transporting concrete to the point of placement.
  - 3) Procedures for placement of concrete.
  - 4) Methods of obtaining and maintaining the required concrete temperature during placement and initial curing.
  - 5) Procedures for consolidating the concrete.
  - 6) Procedures for how concrete is finished and cured (slab-on-grade concrete).
5. Assurance/Control Submittals:
- a. Test Reports: Submit the following reports directly to the Engineer from Testing Laboratory, with copy to Contractor. Prepare reports in conformance with Section 01 40 00 - Quality Requirements.
  - b. Submit laboratory test reports for concrete materials and mix design test, including certified copy of results of aggregate tested by ASTM C1260 or C1567. Mix designs for each strength and type of concrete proposed for use. Details to be included are found in section 2.7.
  - c. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
  - d. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
6. Delivery Tickets:
- a. Copies of delivery tickets for each load of concrete delivered to site.
  - b. Indicate on each ticket information required by ASTM C94 including additional information required herein.
  - c. Mix identification number on ticket shall match number on submitted and approved mix design
  - d. Indicate number of drum revolution from when water is added until concrete is discharged.
  - e. Submit copies to the Testing Laboratory same day as concrete delivery.
7. Verification Samples:
- a. At the exposed concrete location provide a sample of concrete with medium broom finish and sealed for Engineer's approval.
- B. Closeout Procedures and Training: Procedures for closeout submittals.
1. Project Record Documents: Accurately record the following:
    - a. Shop drawings shall be corrected to reflect actual field changes and become part of the "Record As-Built Drawings".

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Division 1 - Product Requirements: Transport, handle, store, and protect Products.

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- B. Deliver materials in unopened containers with labels identifying contents.
- C. Store powdered materials in dry areas and in a manner to prevent damage. Protect liquid materials from freezing or exceeding maximum storage temperatures set by product manufacturer.

1.5 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Jobsite Requirements:
  - 1. Conform to ACI 305 R when placing concrete during hot weather.
  - 2. Conform to ACI 306 R when placing concrete during cold weather.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
  - 1. Applied Concrete Technology, Inc.,
  - 2. The Euclid Chemical Company,
  - 3. Fortifiber Corporation,
  - 4. ChemRex Inc.,
  - 5. W.R. Meadows, Inc.,
  - 6. Reef Industries,
  - 7. Stego Industries LLC.
  - 8. L & M Construction Chemicals, Inc.
  - 9. Curecrete Chemical Company, Inc.
  - 10. Midwest Floor Care Inc.,
  - 11. General Resource Technology, Inc.,
  - 12. Or approved equal.

2.2 CONCRETE MATERIALS

- A. Concrete:
  - 1. Concrete shall be in accordance with ASTM C94. If a conflict exists between ASTM C94 and these specifications, these specifications shall govern.
- B. Portland Cement: ASTM C150 – Type II unless otherwise specified or approved by the Engineer.
  - 1. Assume full responsibility for the quality and soundness of cement. Cement is to be of one type and from the same mill; it is to be of uniform color for all concrete with permanently exposed concrete finishes.

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- C. Liquid admixtures: All admixtures shall be used in conformance with the manufacturer's recommendations. When air entraining admixtures, water reducing admixtures, high range water reducing admixtures, and non-corrosive accelerating admixtures are used in any combination, all products shall be from the same manufacturer, or the ready-mix concrete producer shall certify that they are compatible. The following admixtures are permitted when approved in writing prior to use or are required as specified herein and shall be used in strict accordance with the manufacturer's specifications or recommendations:
1. Calcium chloride: Conform to ACI 301. The water-soluble chloride ion level shall not exceed 0.3 percent by weight of cement.
  2. Air-entraining admixtures: ASTM C260 shall be used to achieve the specified air content in all permanently exposed exterior concrete. For steel hard trowel interior slab finish, do not use air entrainment admixtures. The total air entrainment (entrained and entrapped air) must not exceed 3 percent. For steel trowel exterior slab finish, comply with ACI 318 and ACI 302.
    - a. Euclid: AEA-92 or Air Mix 200.
    - b. BASF: Micro-Air, MBVR-Standard, and MB AE 90.
    - c. Sika: Sika AEA-14, Sika AEA-15, and Sika Air.
    - d. W.R. Grace: Darex EH, Darex II AEA, Daravair AT60, Daravair 1400, and Daravair 1000.
    - e. Or approved equal.
  3. Water-reducing admixtures: Conform to ASTM C494, Type A, containing not more chloride ions than allowed in paragraph C., above.
    - a. Euclid: Eucon WR series or Eucon MR.
    - b. BASF: Masterpave, Masterpave N, PolyHeed 997, Pozzolith 220N, and Glenium 7500.
    - c. W.R. Grace: Daracem 55 and Daracem 65, WRDA 82 and WRDA with HYCOL.
    - d. Sika: Sikament HP, Plastocrete 161, and Sikament 686.
    - e. General Resource Technology: Polychem 400 NC and Polychem 1000.
    - f. Or approved equal.
  4. Water-reducing/accelerating admixtures: Conform to ASTM C494, Type C or E having long-term test results showing non-rusting on metal deck and reinforcing steel.
    - a. Euclid: Accelguard series.
    - b. BASF: Pozzutec 20+, Pozzolith NC 534, and Rheocrete CNI.
    - c. Sika: Sika Rapid-1 and Plasocrete 161FL.
    - d. W.R. Grace: Lubricon NCA, Polarset, and DCI.
    - e. Or approved equal.

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5. Water-reducing/retarding admixtures: Conform to ASTM C494, Type D containing not more than 1 percent chloride ions.
  - a. Euclid: Eucon Retarder series.
  - b. BASF: Delvo Stabilizer, Masterpave series, and Pozzolith 100XR, 200N, 220N and 322N.
  - c. Sika: Plastimet.
  - d. W.R. Grace: Daratard 17, WRDA-64, and WRDA-82.
  - e. Or approved equal.
  
6. High-range/water-reducing (HRWR) admixtures: Conform to ASTM C494, Type F or G super plasticizers containing 1 percent maximum chloride ions may be used with low slump (3 inches maximum) concrete to produce flowable concrete (up to 8 inches slump) with early strength gain and 28-day strengths equal to reference concrete. HRWR admixture may be used providing not more than 60 minutes is allowed from addition of admixture to final placement of concrete. HRWR admixture shall be used in concrete with a maximum water/ cement ratio of 0.50 or less and is suggested in the following:
  - a. In pumped concrete.
  - b. In concrete topping slabs
  - c. In lieu of the specified water-reducing admixture (Type A) where confinement of placing due to heavy reinforcement or narrow space requires flowable concrete.
  - d. Where more than 30 minutes is required between the addition of admixtures to final placement of the concrete, a combination of water-reducing, set controlling admixtures (ASTM C494, Types A, D, & E) as in Master Builders Company "Synergized Performance System" may be used.
    - 1) Euclid: Eucon 37 or Eucon 537.
    - 2) BASF: Rheobuild 1000, Glenium 3000 NS, and Glenium 3400NV.
    - 3) Sika: Sikament 300, Viscocrete 2100, and Sikament 686.
    - 4) W.R. Grace: Daracem 100, ADVA Cast 530, Mira 92, and ADVA Cast 575.
    - 5) Or approved equal.
  
- D. Fly ash: Conform to ASTM C618. The use of quality fly ash will be permitted as a cement-reducing admixture (minimum 15 percent and maximum 25 percent). Fly ash used in concrete shall be from a single source and of a single class in combination with Portland cement of a single source and single class unless otherwise approved by the Engineer. The fly ash shall meet all of the requirements of ASTM C618, Class C or Class F, with the following special requirements: The loss on ignition in Table 1 shall not exceed 3 percent. Compliance with Table 1A shall apply. The amount retained on the 325 sieves in

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Table 2 shall not exceed 34 percent. Where a Type II low-alkali cement is specified, the total C<sub>3</sub>A shall be less than 8 percent of total cementitious material. The chemical analysis of the fly ash shall be reported in accordance with ASTM C311. Quality assurance testing and reports for a minimum of six months shall be submitted by the fly ash supplier. The option to use fly ash must be approved prior to use.

- E. Granulated Blast Furnace Slag is an alternative to fly ash and shall conform to ASTM C989 Grade 100 or 120. Granulated blast furnace slag may be used as a substitute for a maximum of 30 percent of Portland cement.
- F. Certification: Certification of the above requirements is required from the admixture manufacturer prior to mix design review and approval by the Engineer. Upon request by the Engineer, a qualified representative is to be provided to ensure proper use of admixtures. Use of admixtures other than listed above will be permitted only when approved by the Engineer.
- G. Aggregates:
  - 1. Normal-weight concrete - ASTM C33. For slabs, also conform to combined aggregate grading recommendations of ACI 302 and ACI 302.1R, unless otherwise permitted by the Engineer.
  - 2. All concrete exposed to the weather shall conform to the limits of deleterious substances and physical properties of Table 3, ASTM C 33.
  - 3. Local aggregates: Local aggregates not complying with ASTM C33 but which have been shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to the Engineer.
  - 4. The nominal size of an aggregate particle shall not exceed:
    - a. 20 percent of the narrowest dimension between sides of forms.
    - b. 33 percent of the depth of slabs.
    - c. 75 percent of the dimension between reinforcing bars.
    - d. 75 percent of the dimension between reinforcing bars and forms.
  - 5. Maximum size of coarse aggregates and minimum cementitious contents: ACI 301 and ACI 302.1R.
  - 6. Concrete aggregate alkali-silica reactivity (ASR) shall be tested in accordance with ASTM C1260 with a 14-day expansion (no supplementary cementing materials) or ASTM C1567 (with supplementary cementing materials) of less than 0.1 percent. Materials (cement, supplementary cementing materials, and aggregates) to be used in the concrete shall be tested. Coarse aggregates and fine aggregates shall be individually tested. If two grades of coarse aggregates are blended, they shall be individually tested.
  - 7. Abrasive aggregates non-slip finishes: Fused aluminum oxide grits, or crushed emery, as abrasive for non-slip finish with emery aggregate containing not less than 40 percent aluminum oxide and not less than 25

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percent ferric oxide. Use material that is factory-graded, packaged, rustproof, non-glazing, and unaffected by freezing, moisture, and cleaning materials.

H. Water:

1. Clean, potable, and free of injurious amounts of oil, acid, alkali, organic or other deleterious matter not detrimental to concrete; drinkable.
2. Water shall contain no more than 650 parts per million chlorides as Cl or more than 1000 parts per million of sulfates as SO<sub>4</sub>. In no case shall the water contain an amount of impurities that will cause a change in the setting time of Portland cement of neither more than 25 percent nor a reduction in compressive strength of mortar at 14 days of more than 5 percent when compared to the results obtained with distilled water when tested in accordance with ASTM C109.
3. Water used for curing shall not contain impurities in amounts to cause discoloration of the concrete or mortar or to produce etching of the surface.
4. Recycled water shall conform to ASTM C94.

2.3 CURING/SEALING/HARDENERS

- A. Dissipating liquid membrane-forming compounds for curing concrete; Conform to ASTM C309, Type 1. Curing compound shall be compatible with floor sealer or finish used. Low VOC.
1. Euclid: VOX Kurex DR VOX series; waterborne products.
  2. W.R. Meadows: 1100-Clear series.
  3. Edoco: Burke Aqua Resin Cure.
  4. L&M Construction Chemicals: Cure R.
  5. BASF: Kure 200W
  6. Or approved equal.
- B. Method of curing shall be approved by the finish flooring applicator where finishes are indicated.
- C. Liquid Densifier/Sealer/Hardener: to be applied on exposed concrete floors cured with dissipating membrane forming curing compound to harden and densify concrete surfaces. Sealers are to be clear, chemically reactive, a waterborne solution of silicate or silicate materials and proprietary components, odorless, and colorless.
1. ChemMasters: Chemisil Plus
  2. Conspec Marketing and Manufacturing Co., Inc. Intraseal
  3. Euclid Chemical Company: Euco Diamond Hard (Liquid Sealer and Hardener)
  4. L&M Construction Chemicals: Seal Hard (Liquid Sealer and Hardener)
  5. Curecrete Chemical Company: Ashford Formula (Liquid Sealer and Hardener)

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6. W.R. Meadows, Inc.: Liqui-Hard
7. Sika: Sikafloor 3S
8. Sonneborn: Kure-N-Harden
9. Symons Corporation: Buff Hard
10. Or approved equal.

**2.4 JOINTS AND EMBEDDED ITEMS:**

- A. Construction and Contraction Joints: Comply with ACI 301 and recommendations of ACI 302.1R. Sealant shall be two-part semi-rigid epoxy, and shall have minimum Shore A Hardness of 80 when measured with ASTM D2240.
- B. Isolation Joints: Fillers shall consist of 1/8-inch width strips of neoprene, synthetic rubber, or approved substitute, extending the full depth of the slab. Sealant shall be two-part elastomeric type, polyurethane base.

**2.5 VAPOR BARRIER/RETARDER**

- A. Provide cover over prepared soil, above aggregate subbase material at slabs-on-grade, where shown on the plans. Use only materials which are resistant to decay when coated in accordance with ASTM E154.
  1. Vapor Retarder: Polyethylene sheet not less than 10 mils thick, or
  2. Vapor Barrier:
    - a. Stego: Stego Wrap Vapor Barrier 10 –mil
    - b. Fortifiber: Moistop and Moistop Ultra 10.
    - c. Insulation Solution Viper Vaporcheck 10.
    - d. Or approved equal
  3. Vapor Barrier:
    - a. Stego: Stego Wrap Vapor Barrier 15 –mil
    - b. Fortifiber: Moistop and Moistop Ultra 15.
    - c. W.R. Grace: Florprufe 120.
    - d. Insulation Solution Viper Vaporcheck 16
    - e. Or approved equal

**2.6 PROPORTIONING**

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If laboratory trial batch method is used, use an independent testing facility acceptable to the Engineer for preparing and reporting proposed mix designs.
- B. Concrete types and strengths: Minimum 28 Day Compressive Strength shall be as shown on drawings.

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When the concrete mix design is developed from laboratory trial batching, adjust proportions to produce a design mix at least 1200 psi greater than the specified strength.

When the field experience method is used, the required average compressive strength shall be determined in accordance with ACI 318. Documentation that proposed concrete proportions will produce an average compressive strength equal to or greater than the required average compressive strength shall consist of a field strength test record representing materials and proportions to be used for this project. A field strength test record shall consist of at least 10 consecutive tests encompassing a period of time of not less than 45 days and made within the past 12 months.

Also, see general and specific notes on structural drawings.

- C. Weights: All concrete shall be normal-weight concrete unless otherwise designated on the structural drawings.
- D. Aggregate gradation: For slabs, also conform to combined aggregate grading recommendations of ACI 302.1R, unless otherwise permitted. For all other concrete not otherwise noted the coarse aggregate gradation shall conform to ASTM C33 size no. 57 or larger.
- E. Durability: Conform to ACI 301.
  - 1. All concrete exposed to potentially destructive weathering, such as freezing and thawing, or to de-icer chemicals is to be air-entrained, 6 percent  $\pm$ 1percent, a minimum six sacks cementitious per cubic yard of concrete, 0.45 maximum water-cementitious ratio, and, 4-inch maximum slump.
  - 2. Water-cement ratio: For concrete subject to freezing and thawing or deicer chemicals, the water-cement ratio shall not exceed 0.53 by weight including any water added to meet specified slump in accordance with the requirements of ASTM C94 unless otherwise noted.
- F. Slump: Conform to ACI 301.
  - 1. As indicated in drawings.
- G. Slab-On-Grade
  - 1. Concrete shall conform to ACI 302.1R except that the minimum 28-day compressive strength shall be as shown on the drawings.
  - 2. The minimum cementitious content shall be in accordance with ACI 302.1R Table 6.2.
  - 3. The maximum water-cementitious ratio shall be as shown on drawings
  - 4. The maximum water content shall not be greater than 250 lbs per cubic yard of concrete.
  - 5. The air content shall be less than 3 percent.

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- H. Production of concrete: Conform to ACI 301:
1. Cast-in-place concrete used in the work shall be produced at a single off-site batching plant or may be produced at an on-site batch plant.
  2. All concrete shall be proportioned conforming to the approved mix designs and of the materials contained in those approved mixes. A certified copy of the design weights for each mix shall be kept at the producing plant for each class of concrete used on the project.
  3. Plant equipment and facilities are to conform to the "Check List for Certification of Ready-Mixed Concrete Production Facilities" of the National Ready-Mixed Concrete Association (NRMCA) and have NRMCA or approved certification within the past year.
  4. Coarse aggregates shall be washed and, if necessary, shall be uniformly moistened just before batching. Each size of coarse aggregate shall be batched from separate bins as required to produce the combined grading requirements.
  5. Prior to adding a high-range water reducer (super plasticizer), slump shall not exceed the working limit. The high-range water reducing admixture shall be accurately measured and pressure-injected into the mixer as a single dose. If added at the jobsite, the field dispensing system shall conform to the same requirements as a plant system and tested prior to each day's operation. After the addition of the high-range water reducer, the concrete shall be mixed at mixing speed for a minimum of 5 minutes.
  6. Ready-mixed and on-site batched concrete shall be batched, mixed, and transported in accordance with ASTM C94.
    - a. Truck mixers and their operation shall ensure that the discharged concrete is uniformly within acceptable limits of consistency, mix, and grading. All mechanical details of the mixer, such as water-measuring and discharge apparatus, conditions of the blades, speed of rotation, general mechanical condition of the unit, and clearance of the drum shall be checked before the use of the unit will be permitted.
    - b. Truck mixers shall be equipped with approved revolution counters by which the number of revolutions of the drum or blades may readily be verified. The water tank system of the truck shall be equipped with gauges that permit accurate determination of the tank contents.
    - c. Each batch of concrete shall be mixed in a truck mixer for not less than 80 revolutions of the drum or blades and at the rate of rotation designated as mixing speed by the manufacturer of the equipment. Additional mixing, if any, shall be at the speed designated as the agitating speed by the manufacturer of the equipment. All materials, including mixing water but excluding any high-range water reducers added onsite, shall be in the mixer drum before actuating the revolution counter for determining the number of revolutions of mixing.

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- d. The concrete producer shall furnish duplicate delivery tickets, one for the Contractor and one given to the County's Representative for each batch of concrete. The information provided on the delivery ticket shall include the quantity of materials batched including the amount of free water in the aggregate and any water added onsite. Show the date, time of day batched, and if ready-mixed the time of discharge from the truck. The quantity of water that can be added at the site without exceeding the maximum water-cementitious ratio specified shall be noted on the delivery ticket.
7. Concrete produced by on-site volumetric batching and continuous mixing if approved shall conform to ASTM C685.
8. For concrete produced on site with a central batch plant, mixing shall be done in an approved batch mixer.
  - a. The Contractor shall maintain and operate the on-site batch plant and transportation equipment in a manner that will produce the results specified in this section.
  - b. The Engineer reserves the right to reject the proposed on-site plant if, in his/her opinion, the on-site plant will interfere with other operations or impair the quality of the concrete.
  - c. The quantities of cement, pozzolanic materials, and aggregates used in each batch shall be determined by automatic weighing. The quantity of water shall be determined by weighing or volumetric measurement.
  - d. The weighing equipment for aggregates shall be readily adjustable both to compensate for variation in moisture content of the aggregates and for changing mix proportions. Moisture-sensing devices shall automatically compensate the aggregate weights for changes in moisture content. The charging of weigh hoppers directly from aggregate handling equipment such as front-end loaders will not be permitted.
  - e. Mixers in centralized batching and mixing plants shall be arranged so that mixing actions can be observed from a location convenient to the mixing-plant operator's station.
  - f. Equipment shall be provided that discharges pozzolanic material into the cement hopper only after the addition of the Portland cement. Pozzolanic materials shall be stored in such a manner as to permit ready access for the purpose of inspection and sampling and be suitably protected against contamination of moisture. Should any pozzolan show evidence of contamination or be otherwise unsuitable, the Engineer will reject it and require that it be removed from the site.
  - g. Dispensers for admixtures shall have the capacity of the full quantity of the properly diluted solution required for each batch. They shall be maintained in a clean and freely operating condition. Admixtures shall be added to the premeasured water for the batch or shall be discharged into the batch by flowing automatically and uniformly into the stream of mixing water from the beginning to end of its flow into

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- the mixer. Equipment for measurement shall give visual confirmation of the accuracy of the measurement for each batch.
- h. The central batch mixer shall be rotated at a speed recommended by the manufacturer and mixing shall be continued for a minimum of 1-1/2 minutes after all materials are in the drum.
  - i. Each stationary mixer shall be equipped with a mechanically operated timing and signaling device that will indicate and ensure the completion of the required mixing period and will count the batches.
  - j. All concrete shall be mixed until there is a uniform distribution of the materials and shall be discharged completely before the mixer is recharged.
- 9. The Engineer may increase the mixing time when the charging and mixing operations fail to produce a delivered batch in which variations of consistency, mix, or grading are within the limits specified.
  - 10. Variations in consistency during the discharge of a single batch shall not exceed 1 inch of slump, except that a greater variation will be permitted if the slump of the concrete decreases and no water is added. Variations in mix and in grading of different parts of the delivered batch shall be within limits stated in ASTM C94.
  - 11. Water shall be introduced prior to, during, and following mixer-charging operations.
  - 12. When a mixer produces unsatisfactory results, it shall be repaired promptly and effectively, or it shall be replaced.
  - 13. Mixers shall not be loaded in excess of their rated capacity.
  - 14. Overmixing, such as requiring addition of water to preserve the required consistency or to reduce slump, will not be permitted.
  - 15. All other concrete: Conform to ACI 301
  - 16. Use of accelerating admixtures in cold weather and retarding admixtures in hot weather shall not relax placement requirements specified herein.
  - 17. All concrete placed at ambient temperatures below 50 degrees F is to contain an approved accelerator. The concrete temperature when delivered at the site shall be at least 50 degrees F.
  - 18. All concrete placed at ambient temperatures above 80 degrees F is to contain an approved retarder.
  - 19. All concrete required to be air-entrained is to contain an approved air-entraining admixture.
  - 20. When improved workability, pumpability, lower water-cement ratio, or high ultimate and/or early strength is required, the HRWR admixture (super plasticizer) may be used.
  - 21. Ensure air content for slabs with steel trowel finish is less than 3.0 percent.
  - 22. The concrete shall be of such consistency and composition that it can be worked readily into the corners and angles of the forms and around reinforcement without permitting materials to segregate or free water to collect on the surfaces. Within the limiting requirements, adjust the consistency of the concrete as may be necessary to produce mixtures which

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will be placeable with reasonable methods of placing and compacting. Maintain on the job at all times adequate extra cement to be used at rate of 1/2 sack cement per cubic yard concrete for each 2" slump increase for corrections due to wetness desired or obtained. No water shall be added to concrete except with the approval of the County inspector.

23. No water shall be added to concrete except with the approval of the County inspector. The water-cementitious ratio stated on the approved mix designs shall not be exceeded unless approved by the Engineer. Re-tempered concrete shall be mixed for not less than 80 revolutions of the drum or blades and at the rate of rotation designated as mixing speed by the manufacturer of the equipment.
24. Adjustments to concrete mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant at no additional cost to County. Laboratory test data for revised mix design and strength results must be submitted and accepted before using in work.

**2.7 REINFORCING MATERIALS**

- A. Section 03 2000: Concrete Reinforcement

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Division 1 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected and approved by the Engineer.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the County.

**3.2 INSTALLATION - GENERAL**

- A. Install all cast-in-place concrete work in accordance with ACI 301 except as herein specified.

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- B. All bearing materials shall be inspected by the Engineer prior to placing concrete. The Engineer shall be the sole judge as to the suitability of the bearing material.
- C. Compact stone base aggregate to thickness indicated on drawings. Proof roll stone screenings topping to provide smooth hard surface on which to place slab. Surface should not show footprints or truck tracks when driven over.
- D. Immediately before placing concrete, spaces to be occupied by concrete shall be free from standing water, ice, mud, and debris.
- E. Concrete shall not be deposited under water or where water in motion may injure the surface finish of the concrete.
- F. Immediately before placing concrete for exterior sidewalk, curb and gutter, pavements, and slab-on-grade, subbases and compacted subgrades shall be thoroughly moistened, but not muddied, by sprinkling with water. Surfaces shall be kept moist by frequent sprinkling, as required, up to the time of placing of concrete.
- G. Place and properly support reinforcing steel and anchor bolts.

**3.3 REINFORCEMENT**

- A. Placement: Section 03 2000 - Concrete Reinforcement

**3.4 METHODS OF PLACEMENT AND PLACING CONCRETE**

- A. Placement: Conform to ACI 301:
  - 1. Maintain concrete cover around reinforcing as per Section 3.3 above and ACI 301.
  - 2. The methods and equipment used for transporting concrete to the site work and the time that elapses during transportation shall not cause segregation of coarse aggregate or slump loss in excess of 1 inch when measured at the point of discharge.
  - 3. Concrete shall be placed within 90 minutes after the water has been added to the cement and aggregates. Concrete shall be placed prior to initial concrete set.
- B. Depositing Concrete
  - 1. Deposit concrete as near its final position as possible to avoid segregation due to rehandling or flowing. Hoppers, tremies, pump line, ducts, chutes, or other methods approved by the Engineer shall be used to deposit concrete

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in its final position within the specified time limits and without segregation of the mix.

2. The sequence of concrete placement and the number, type, position, and design of joints shall be approved by the Engineer prior to concrete placement.
3. Place floor slabs-on-grade by "strip cast" method.

**C. Conveyor Belts and Chutes**

1. Chutes or conveyor belts shall not be used except as approved by the Engineer.
2. Concrete shall be conveyed from the mixer to the place of final deposit by methods that will prevent separation and loss of material.
3. Chutes longer than 50 feet and conveyor belts longer than 110 feet will not be permitted.

**D. Pumping of Concrete**

1. The type and operation of a concrete pump shall be subject to the approval of the Engineer. The equipment used in placing the concrete and the method of its operation shall introduce the concrete into the forms without high velocity.

**E. Joints**

1. Joints shall be vertical in walls and horizontal in slabs.
2. Dowel bars and tie bars shall be inspected.
3. Control joints for controlling concrete shrinkage shall be provided in floor slabs, walls, decks, conduits, and channels as shown on the plans or approved by the Engineer.
4. Joint spacing and sawcut depth for slab-on-grade shall be as follows:
  - a. Sawed control (contraction) joints for pavements and slab-on-grade shall be installed as soon as practical so as not to ravel the concrete but less than 12 hours.
  - b. The minimum sawcut joint depth shall be 1/4 of the slab thickness unless an early-entry SOFF-CUT saw is used in accordance with manufacturer recommendations (typically sawed between 1 to 4 hours after finishing to a 1-inch minimum depth).
  - c. Joint spacing shall in feet shall not exceed 2-1/2 times the slab thickness in inches unless otherwise approved by the Engineer.
  - d. The long dimension of a slab shall not exceed 1.5 times the short dimension unless otherwise approved by the Engineer.
5. If there is a delay in casting but prior to concrete initial set, the concrete placed after the delay shall be thoroughly spaded and consolidated at the edge of that previously placed to avoid cold joints. Concrete shall then be brought to correct level and struck off with a straight edge. Bullfoats shall be used to smooth slab surfaces, leaving it free of humps or hollows.

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6. Where placing concrete is interrupted long enough for the concrete to take its initial set, the working face shall be made a construction joint.
    - a. Preparation and disposition of unplanned cold joints in walls shall be approved by the Engineer.
    - b. For slab-on-grade, pavements, sidewalk, and curb and gutter, concrete shall be removed back to the nearest planned joint and a construction joint installed.
  7. Unless otherwise noted on the drawings, where concrete is to be placed against existing concrete, except in the case of expansion joints, the joint face of the existing concrete shall be roughened.
    - a. Before new concrete is placed against hardened concrete, the bonding surface of the existing concrete shall be roughened to an amplitude of 0.25 inch using bush hammers, abrasive blasting, or high-pressure water blasting.
    - b. Fresh concrete may be green cut with water blasting and hand tools to remove concrete laitance and spillage and to expose sound aggregate.
    - c. The prepared surfaces of hardened concrete shall be kept thoroughly wet during the 24-hour period immediately prior to the placement of the new concrete. Wetting shall be accomplished by continuous sprinkling or by covering exposed surfaces with wet burlap.
    - d. Where shown on the drawings or permitted by the Engineer, bond-preventing compound shall be applied by brush in accordance with the manufacturer's printed instructions.
- F. Consolidation
1. Concrete for slabs 8 inches thick or less may be consolidated with vibrating screeds. Slabs between 8 to 12 inches thick shall be compacted with internal vibrators and (optionally) with vibrating screeds.
  2. Concrete shall be consolidated by vibration to the maximum practicable density. The concrete shall be free from pockets of coarse aggregate and entrapped air.
  3. Consolidation shall be carried on continuously with the placing of concrete.
- G. Repair of surface defects: ACI 301.
1. Inspect concrete surfaces and surfaces to be painted immediately upon removal of forms. Irregularities shall be immediately rubbed or ground to secure a smooth, uniform, and continuous surface.
  2. Clean surfaces of tie holes. Tie holes shall be filled solid with patching mortar.
  3. Surfaces to be smoothed shall not be plastered or coated.
  4. Patch imperfections as needed or as directed by the Engineer. Repairs in accordance with Section 3.8 shall not be made until the surface has been inspected and repair methods have been approved by the Engineer.

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**3.5 FINISHING**

- A. Slabs: Minimum slab surface tolerance must satisfy ACI 301 and ACI 302.1R as measured in accordance with ASTM E1155.
1. Slabs-on-grade:
    - a. For exposed slabs, install semi-rigid epoxy sealant in construction and contraction joints after slab has a minimum of 60 days or otherwise approved by the Engineer.
    - b. Separate slabs-on-grade from vertical surfaces with 1/2-inch-thick joint filler. Extend joint filler from bottom of slab to within 1/8 inch of finished slab surface.
    - c. Allowable tolerance for slab on grade surfaces, measured in accordance with ACI 117 and ASTM E1155, shall meet or exceed an overall value of FF35/Fl25, with minimum local value of FF24/FL17.
  2. Concrete Finishes:
    - a. The following will not be permitted on slab or floor finishes:
      - 1) Dusting dry cement or sand on the surface to absorb excess moisture.
      - 2) Use of a mortar finishing coat.
      - 3) Excessive troweling or manipulation that brings water or a large number of fines to the surface.
      - 4) Addition of water to the surface during the finishing operation.
      - 5) Use of the floor during construction in a manner that leads to marring or staining the finish.
    - b. Surface preparation
      - 1) The concrete shall be brought up evenly to slightly above finished grade and shall be thoroughly compacted and consolidated. The top shall be struck off to accurately established grade strips or grade blocks. Complete screeding before any excess moisture or bleedwater is present on the surface.
      - 2) After bull floating, defer additional finishing operations until the concrete has stiffened sufficiently to sustain foot traffic pressure with an indentation of not more than 1/4 inch.
    - c. Floor Slabs: Steel trowel finish unless otherwise noted on the plans. The finish surface shall match that of the adjacent existing concrete. As soon as the moisture sheen has disappeared from the floated surface and the concrete has hardened sufficiently to prevent drawing moisture and fine materials to the surface, the surface shall be steel troweled to produce a smooth, hard, uniform finish. Final steel troweling shall be conducted after the concrete is hard enough that no mortar accumulates on the trowel when manipulated with heavy pressure. Machine finishing may be used for troweling.

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- d. Exposed concrete slabs shall be sealed or sealed and hardened using a liquid compound compatible with the curing method used as described in: 3.7 Curing, Protection, Liquid Hardeners and Sealers of this Section.

**3.6 CURING, PROTECTION, LIQUID HARDENERS AND SEALERS**

**A. Curing Compound**

- 1. All curing methods shall be placed immediately after final finishing (i.e., within two hours). The contractor's attention is directed to the fact that experience shows the most important time of curing is from three to four hours after placing and extending five to six hours thereafter. It is extremely important, therefore, to prevent loss of moisture, particularly during this period when concrete is especially vulnerable to plastic shrinkage cracks. All exposed surfaces of concrete including floor slabs, whether or not they receive a finish flooring, shall be protected from premature drying for a minimum of seven days.
- 2. Apply the specified curing compound in strict accordance with manufacturer's written instructions. Curing compound shall not be diluted by the addition of solvents or thinners, nor shall it be altered in any other manner. Curing compound that has become chilled and is too viscous for satisfactory application shall be heated by steam or hot water bath until it has proper fluidity. The temperature of the compound shall not exceed 100 °F. Curing compound shall not be heated by direct exposure of the container to fire.
- 3. When used on an unformed concrete surface, application of the first coat of curing compound shall commence immediately after finishing operations have been completed. When curing compound is used on a formed concrete surface, the surface shall first be moistened with a fine spray of water immediately after the forms have been removed. The spray shall be continued until the surface does not readily absorb further water. As soon as the surface film of water has disappeared and the surface is almost dry, the first coat of curing compound shall be applied. In the event that application is delayed on either formed or unformed surfaces, the surface shall be kept continuously moist until the compound has been applied or the specified period of water curing has elapsed.
- 4. Surfaces shall be sprayed uniformly with 2 coats of curing compound. Each coat shall provide a minimum coverage of 1 gallon per 250 square feet of surface. As soon as the first coat has become dry, a second coat shall be applied in the same manner. The direction of application of the second coat shall be perpendicular to the first coat. The curing compound shall be sprayed using approved pneumatic or pump driven equipment having the following characteristics:
  - a. Separate lines to the nozzle for material and for compressed air
  - b. A filtering system for the removal or entrapment of contaminants

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- c. A constant application pressure.
- 5. Curing compounds shall not be used on any concrete surface specified to receive additional concrete, coatings, grout, and chemical treatment.

**B. Protection**

- 1. The contractor shall allow no traffic and take precautions to avoid damage to the membrane of the curing compound for a period of not less than 28 days. Damage shall be repaired immediately to the satisfaction of the Engineer.
- 2. Special care shall be taken to prevent damaging the surfaces and joints due to load stresses from construction equipment, heavy shock, and excessive vibration. During construction activities, concrete shall be protected against damage with plywood or other approved materials until final acceptance by the Engineer.

**C. All floor slabs shall be cured using products and methods compatible with selected floor adhesives, toppings, and other finish materials.**

**D. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instruction.**

**3.7 PATCHING AND REPAIR**

**A. Concrete will be considered by the Engineer as not conforming to the intent of the drawings and specifications for the following reasons:**

- 1. Concrete is not formed as shown on the drawings.
- 2. Concrete is not in true alignment or level.
- 3. Concrete which exhibits a defective surface.
- 4. Concrete with defects that reduce the structural integrity of a member or members.
- 5. Concrete jointed slabs with uncontrolled random cracking.

**B. Non-conforming concrete to required thickness, lines, details, and elevations will be rejected by the Engineer and shall be modified or replaced with concrete that conforms to the contract requirements without a claim by the Contractor for additional cost or extension of contract time.**

**C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of County Engineer for each individual area. Should the County Engineer grant permission for the Contractor to attempt restoration of a defective area by patching or other repair methods, such permission shall not be considered a waiver of the Engineer's right to require complete removal of the defective area if, in the Engineer's opinion, the restoration does not provide the structural or aesthetic integrity of the member or members.**

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- D. All repairs of defective areas shall conform to ACI 301. On areas requiring treatment of defects and until such repairs have been completed, only water cure will be permitted.
- E. At any time prior to final acceptance, concrete found to be defective, damaged, or not in accordance with the specifications shall be repaired or removed and replaced with acceptable concrete.

**3.8 ACCEPTANCE OF STRUCTURE**

- A. Comply with ACI 301 and modifications in this section.
- B. Completed concrete work, which meets all applicable requirements, will be accepted without qualification.
- C. Completed concrete work which fails to meet one or more requirements but which has been repaired to bring it into compliance will be accepted without qualification.
- D. Completed concrete work which fails to meet one or more requirements and which cannot be brought into compliance may be accepted or rejected by the County Engineer. In this event, modifications may be required to assure that remaining work complies with the requirements.
- E. The costs of any additional tests or analysis, including additional architectural and engineering services, performed to prove the adequacy of the concrete work, shall be borne by the Contractor without extension of contract time.

END OF SECTION

## **SECTION 05 3100 STEEL DECKING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Steel roof deck and accessories.
  - 2. Framed openings up to 10 inches by 10 inches.
  - 3. Welding, fasteners, and accessories for attachment of deck.
  
- B. Related Documents: The Contract Documents, as defined in Section 01010 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
  
- C. Related Sections:
  - 1. Section 05 12 00 – Steel Framing: Support framing for openings larger than 10 inches x 10 inches.
  - 2. Section 05 12 00 - Steel Framing

#### **1.2 REFERENCES**

- A. American Iron and Steel Institute (AISI):
  - a. Specification for the Design of Cold-Formed Steel Structural Members.
  
- B. American Society for Testing and Materials (ASTM):
  - 1. ASTM A 1008 - Specification for Structural Steel, Sheet, Carbon, Cold-Rolled.
  - 2. ASTM A 653 – Specification for Steel Sheet, Zinc Coated, Galvanized.
  
- C. American Welding Society (AWS):
  - 1. AWS D1.1 - Structural Welding Code.
  - 2. AWS D1.3 - Structural Welding Code - Sheet Steel.
  
- D. Steel Deck Institute (SDI):
  - 1. Design Manual for Composite Decks, Form Decks, Roof Decks, (Publication No. 25).
    - a. Code of Recommended Standard Practice.
    - b. Specifications and Commentary for Steel Roof Deck.
  - 2. SDI Diaphragm Design Manual 1st Edition.
  
- E. Steel Structures Painting Council (SSPC):
  - 1. SSPC-Paint 20 Type II - Zinc Rich Primers - Organic.
  - 2. SSPC-Paint 25 - Red Iron Oxide, Zinc Oxide, Raw Linseed Oil, and Alkyd Primer.

#### **1.3 SUBMITTALS**

- A. Section 01 33 23 - Shop Drawings, Product Data, Samples: Procedures for submittals.

## SECTION 05 3100

### STEEL DECKING

1. Product Data: Deck profile characteristics and dimensions, structural properties, and finishes.
2. Shop Drawings: Indicate deck plan, support locations, projections, openings and reinforcement, pertinent details, and accessories.
3. Assurance/Control Submittals:
  - a. Certificates: Certify welders employed on Work, verifying AWS qualification within previous 12 months.
  - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.

#### 1.4 QUALITY ASSURANCE

##### A. Qualifications:

1. Fabricator: Company specializing in performing the work of this section with minimum 10 years documented experience.
2. Erector: Company specializing in performing the work of this section with minimum 10 years documented experience, certified by AISC Quality Certification Program.
3. Qualifications for Welding Work: Qualify welding operators in accordance with AWS Standard Qualification Procedures. Provide certification that welders employed in work have satisfactorily passed AWS qualification tests within previous 12 months. If recertification of welders is required, provide without additional cost to the Owner.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Section 01 60 00 – Product Requirements: Transport, handle, store, and protect Products.
- B. Prevent damage to edges, ends and surfaces.
- C. Cut plastic wrap to encourage ventilation. Keep materials dry.
- D. Separate sheets and store materials on dry wood sleepers off ground or concrete; slope for positive drainage.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

#### A. Sheet Steel:

1. ASTM A-611, Grade C, structural quality; with G90 galvanized coating conforming to ASTM A-525.

#### B. Bearing Plates and Angles: ASTM A 36 steel.

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STEEL DECKING**

- C. Welding Materials: AWS D1.1.
- D. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.
- E. Touch-Up Primer for Galvanized Surfaces: SSPC 20, Type 1, inorganic.
- F. Flute Closures: Closed cell foam rubber, 1 inch thick; profiled to fit tight to decking.
- G. Closure Strips, Cover Plates, and related Accessories: Fabricated of metal of same type and finish as deck.

**2.3 FABRICATION**

- A. Steel Roof Deck: Minimum gage sheet steel as indicated on Drawings, 1-1/2 inch high, fluted profile to SDI WR; multiple span; lapped joints.
- B. Fabricate metal decking in accordance with the SDI Design Manual for Composite Decks, Form Decks, Roof Decks, and AISI, to accommodate maximum working stress of 20,000 psi and maximum span deflection of 1/240.
- C. Fabricate roof sump pan of 14 gage sheet steel, flat bottom, sloped sides, recessed 1-1/2 inches below roof deck surface, bearing flange 3 inches wide, sealed watertight.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Project Manager prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

**3.2 INSTALLATION**

- A. Erect metal decking and connect to structure in accordance with SDI Design Manual for Composite Decks, Form Decks, Roof Decks. Coordinate attachment sequence and procedure with placing of units; show on shop drawings.
- B. On steel support members provide 1-1/2 inch minimum bearing.
- C. Align and level deck on supports.
- D. Provide welds, fasteners, and lap connectors of size, spacing, and location as indicated on Drawings.

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### **STEEL DECKING**

- E. Welding: In accordance with AWS D1.1 and D1.3.
  - F. Install 6 inch wide sheet steel cover plates where deck changes direction. Spot weld in place 12 inches on center maximum. Install sheet steel closures and angle flashings to close openings between deck and walls, columns, and openings.
  - G. Position roof sump pans with flange bearing on top surface of deck. Weld at each deck flute.
  - H. Immediately after welding deck in place, touch-up welds, burned areas, and surface coating damage with compatible primer paint.
- 3.3 FIELD QUALITY CONTROL
- A. Section 01 40 00 - Quality Requirements: Field testing and inspection.
  - B. Inspection:
    - 1. Select 6 random sheets for each type of deck used. Inspect for deck thickness, type, and material.
    - 2. Inspect 10 percent of deck welds over entire roof area for size and spacing
      - A. .
    - 3. Inspect 10 percent of lap connectors over entire roof area for type, size, and spacing of side lap connectors.

SECTION 05 31 00 STEEL DECKING  
END OF SECTION

NOT FOR BID

05 31 00 - 5

County of Pasadena  
Fire Stations 33  
Pre-Fab Storage Building Project

**SECTION 06 1000  
ROUGH CARPENTRY**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

A. Section Includes:

1. Framing with dimension lumber.
2. Framing with timber.
3. Framing with engineered wood products.
4. Shear wall panels.
5. Wood blocking and nailers.
6. Wood furring.

B. Related Requirements:

1. Section 06 1600 "Sheathing" for sheathing, subflooring, and underlayment.

**1.3 DEFINITIONS**

- A. Boards or Strips: Lumber of less than 2 inches nominal (38 mm actual) size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) size or greater but less than 5 inches nominal (114 mm actual) size in least dimension.
- C. Timber: Lumber of 5 inches nominal (114 mm actual) size or greater in least dimension.

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**1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
- B. Include data for wood-preservative treatment from chemical treatment manufacturers and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
- C. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
- D. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
- E. For products receiving a waterborne treatment, include a statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

**1.5 INFORMATIONAL SUBMITTALS**

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design value approved by the ALSC Board of Review.
- B. Evaluation Reports: For the following, from ICC-ES:
  - 1. Wood-preservative-treated wood.
  - 2. Fire-retardant-treated wood.
  - 3. Engineered wood products.
  - 4. Shear panels.
  - 5. Power-driven fasteners.

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6. Post-installed anchors.
7. Metal framing anchors.

**1.6 QUALITY ASSURANCE**

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

**1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Stack wood products are flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from the weather by covering them with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

**PART 2 - PRODUCTS**

**2.1 WOOD PRODUCTS, GENERAL**

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
- B. Factory marks each piece of lumber with grade stamp of grading agency.
- C. Dress lumber, S4S, unless otherwise indicated.
- D. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal (38-mm actual) thickness or less; 19 percent for more than 2-inch nominal (38-mm actual) thickness otherwise indicated.
- E. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

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- F. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. A manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

**2.2 WOOD-PRESERVATIVE-TREATED LUMBER**

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
- B. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- D. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- E. Application: Treat all rough carpentry unless otherwise indicated.
- F. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
- G. Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.
- H. Wood floor plates that are installed over concrete slabs-on-grade.

**2.3 FIRE-RETARDANT-TREATED MATERIALS**

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test- response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

**SECTION 06 1000  
ROUGH CARPENTRY**

- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
- C. Treatment shall not promote corrosion of metal fasteners.
- D. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
- E. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- F. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D 5664 and design value adjustment factors shall be calculated according to ASTM D 6841.
- G. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.
- H. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- I. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.
- J. Application: Treat items indicated on Drawings, and the following:
  - 1. Framing for non-load-bearing partitions.
  - 2. Roof construction.

**2.4 DIMENSION LUMBER FRAMING**

- A. Non-Load-Bearing Interior Partitions: As indicated on Drawings.

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- B. Load-Bearing Partitions: As indicated on Drawings.
- C. Joists, Rafters, and Other Framing Not Listed Above: As indicated on Drawings.
- D. Exposed Framing: As indicated on Drawings.
- E. Species and Grade: As indicated on Drawings.

**2.5 TIMBER FRAMING**

- A. Comply with the following requirements, according to grading rules of grading agency indicated:
- B. Species and Grade: Douglas fir-larch, Douglas fir-larch (north), or Douglas fir-south; No. 1 grade; NLGA, WCLIB, or WWPA.
- C. Maximum Moisture Content: 19 percent.
- D. Additional Restriction: Free of heart centers.

**2.6 ENGINEERED WOOD PRODUCTS**

- A. Source Limitations: Obtain each type of engineered wood product from a single source from a single manufacturer.
- B. Rim Boards: Product designed to be used as a load-bearing member and to brace wood I-joists at bearing ends, complying with research or evaluation report for I-joists.
- C. Material: Product made from any combination of solid lumber, wood strands, and veneers.
- D. Thickness: 1-1/4 inches (32 mm), unless indicated on Structural Drawings.
- E. Comply with APA PRR-401, rim board grade. Factory mark rim boards with APA-EWS trademark indicating thickness, grade, and compliance with APA-EWS standard.

**SECTION 06 1000  
ROUGH CARPENTRY**

2.7 SHEAR WALL PANELS

- A. Wood-Framed Shear Wall Panels: Prefabricated assembly consisting of wood perimeter framing, tie downs, and Exposure I, Structural I plywood or OSB sheathing.

2.8 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
  2. Nailers.
  3. Furring.
- B. Dimension Lumber Items: Standard, Stud, or No. 3 grade lumber of any of the following species:
1. Western woods; WCLIB or WWPA.
- C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.9 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.

**SECTION 06 1000  
ROUGH CARPENTRY**

- B. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- C. Nails, Brads, and Staples: ASTM F 1667.
- D. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- E. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on appropriate ICC-ES for the substrate.

2.10 METAL FRAMING ANCHORS

- A. Allowable design loads, as published by manufacturer, shall meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
  - 1. Joist Hangers: As indicated on Structural Drawings.
  - 2. Top Flange Hangers: As indicated on Structural Drawings.
  - 3. Post Bases: As indicated on Structural Drawings.
  - 4. Joist Ties: As indicated on Structural Drawings.
  - 5. Hold-Downs: As indicated on Structural Drawings.

2.11 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other

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ROUGH CARPENTRY**

construction. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.

- D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Install shear wall panels to comply with manufacturer's written instructions.
- F. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- G. Install sill sealer gasket to form a continuous seal between sill plates and foundation walls.
- H. Do not splice structural members between supports unless otherwise indicated.
- I. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- J. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.
- K. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
  - L. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches (2438 mm) o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
  - M. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches (2438 mm) o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal (38-mm actual) thickness.
- N. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

**SECTION 06 1000  
ROUGH CARPENTRY**

- O. Comply with AWPAC M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- P. Use inorganic boron for items that are continuously protected from liquid water.
- Q. Use copper naphthenate for items not continuously protected from liquid water.
- R. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- S. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
- T. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
- U. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
- V. ICC-ES evaluation report for fastener.
- W. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- X. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

2.12 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

**SECTION 06 1000  
ROUGH CARPENTRY**

- C. Provide permanent grounds of dressed, pressure-preservative- treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

2.13 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal- (19-by-63-mm actual-) size furring at 24 inches (610 mm) o.c. unless noted otherwise.
- C. Furring to Receive Gypsum Board Install 1-by-2-inch nominal- (19-by-38-mm actual-) size furring vertically at 16 inches (406 mm) o.c. unless noted otherwise.

2.14 WALL AND PARTITION FRAMING INSTALLATION

- A. General: Provide single bottom plate and double top plates using members of 2-inch nominal (38-mm actual) thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions. Fasten plates to supporting construction unless otherwise indicated.
- B. For exterior walls see Structural Drawings.
- C. For interior partitions and walls see Structural Drawings.
- D. Construct corners and intersections as indicated on Structural Drawings.
- E. Frame openings with multiple studs and headers, see Structural Drawings

2.15 CEILING JOIST AND RAFTER FRAMING INSTALLATION

- A. Ceiling Joists: Install with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.

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ROUGH CARPENTRY**

- B. Rafters: Notch to fit exterior wall plates and use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.

2.16 TIMBER FRAMING INSTALLATION

- A. Install timber beams with crown edge up and provide not less than 4 inches (102 mm) of bearing on supports. Provide continuous members unless otherwise indicated; tie together over supports as indicated if not continuous.
- B. Install wood posts using metal anchors indicated on Structural Drawings.
- C. Treat ends of timber beams and posts exposed to weather by dipping in water-repellent preservative for 15 minutes.

END OF SECTION

**SECTION 07 21 00  
BUILDING INSULATION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Batt Insulation in exterior wall and ceiling construction.
  - 2. Vapor retardant.
  - 3. Air infiltration seal.
  
- B. Related Documents: The Contract Documents, as defined in Division 1 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

**1.2 REFERENCES**

- A. American Society for Testing and Materials (ASTM):
  - 1. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
  - 2. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
  - 3. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
  - 4. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  
- B. Federal Specifications (FS):
  - 1. FS HH-I-1972/GEN - Insulation Board, Thermal, Faced, Polyurethane or Polyisocyanurate.

**1.3 SUBMITTALS**

- A. Division 1 - Submittals: Procedures for submittals.
  - a. Product Data: Indicate product characteristics, performance criteria, and limitations.

**1.4 QUALITY ASSURANCE**

- A. Regulatory Requirements: Conform to insulation flame spread and smoke developed requirements of local authority having jurisdiction.

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**SECTION 07 21 00  
BUILDING INSULATION**

- B. Certification: For projects California provides Products certified by manufacturer that meet California Quality Standards for Insulating Materials.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Transport, handle, store, and protect Products.
- B. Protect insulation from moisture, soiling and other damaging items.
- C. Store in dry location protected from sunlight.

**1.6 ENVIRONMENTAL REQUIREMENTS**

- A. Resource Management:
  - 1. Recycled Content: Provide fiberglass insulation manufactured from minimum 30 percent recycled glass.
- B. Environmental Impact:
  - 1. Only Greenguard indoor air quality certified products will be permitted.
  - 2. Chlorofluorocarbons (CFCs): Products and equipment requiring or using CFCs during the manufacturing process will not be permitted.

**PART 2 - PRODUCTS**

**2.1 BATT INSULATION**

- A. Manufacturers:
  - 1. Johns Manville Corporation, Denver, Co (800) 654-3103.
  - 2. Knauf Fiberglass, Shelbyville, IN (317) 398-4434, (800) 825-4434.
  - 3. Owens-Corning Fiberglass Corporation, Toledo, OH (419) 248-8000, (800) 438-7465.
  - 4. Section 01 60 00 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Materials: Fiberglass insulation manufactured from a minimum of 30 percent recycled glass.
  - 1. Unfaced Glass Fiber: ASTM C 665, Type I, unfaced. Thermal resistance R-value as indicated on Drawings.
  - 2. Faced Glass Fiber: ASTM C 665, Type III, Class A, with reflective covering one side. Thermal resistance R-value as indicated on Drawings.

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**SECTION 07 21 00  
BUILDING INSULATION**

2.2 VAPOR RETARDANT

- A. ASTM D 4397, 6 mils thick, maximum permeance rating of 0.13 perm.
- B. Vapor Retardant Tape: Pressure-sensitive type recommended by vapor retardant manufacturer for sealing joints and penetrations in vapor retardant.

2.3 AIR INFILTRATION SEAL

- A. Manufacturer:
  - 1. Tenneco Building Products, Smyrna, GA (800) 241-4402.
  - 2. DuPont, Wilmington, DE (800) 448-9835.
  - 3. Section 01 60 00 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Materials: One of the following two types of materials:
  - 1. 15-pound, type 1, grade D, 10-minute unperforated asphalt saturated organic felt in accordance with ASTM D22.
  - 2. Coated, cross-woven polyethylene or polypropylene fabric:
    - a. Tenneco: Amowrap Housewrap.
    - b. DuPont: Tyvek Housewrap.
    - c. Air Infiltration Seal Tape: Pressure sensitive of type recommended by vapor retardant manufacturer for sealing joints and penetrations in air infiltration seal.

2.4 ACCESSORIES

- A. Tape: Polyethylene or polyester self-adhering type; 2 inches (5.08 cm) wide.
- B. Adhesive: Waterproof type, acceptable to manufacturer of insulation board.
- C. Wire Mesh: Galvanized steel, hexagonal wire mesh.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

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**SECTION 07 21 00  
BUILDING INSULATION**

1. Batt Insulation:
  - a. Verify adjacent materials are dry and ready to receive installation.
  - b. Verify mechanical and electrical services within walls have been installed and tested.
- C. Report in writing to Project Manager prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the County.

**3.2 INSTALLATION - BATT INSULATION**

- A. Install batt insulation in accordance with manufacturer's instructions, without gaps or voids.
- B. Trim insulation neatly to fit spaces. Use batts free of damage. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation.
- C. Install insulation with factory applied membrane facing warm side of building spaces. Lap ends and side flanges of membrane. Attach insulation in place to framing; tape seal butt ends and lapped side flanges. Tape seal tears or cuts in membrane.

**3.3 INSTALLATION - VAPOR RETARDANT AIR INFILTRATION SEAL**

- A. Install vapor retardant air infiltration seal over entire building exterior walls and adjacent surfaces.
- B. Seal vertical joints over framing by lapping minimum 2 stud spaces. Fasten to framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints.
- C. Seal joints are caused by pipes, conduits, electrical boxes, and similar items with manufacturer's sealing tape. Seal penetrations air-tight.

END OF SECTION

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**SECTION 07 9200  
JOINT SEALANTS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Joint sealants.
  - 2. Preparation for application of sealants.
- B. Related Requirements:
  - 1. Division 01 - General Requirements.
  - 2. Section 06 2000 - Finish Carpentry.
  - 3. Division 08 - Openings.
  - 6. Division 09 - Finishes.
  - 7. Section 102813 - Toilet Accessories.

**1.2 SUBMITTALS**

- A. Shop Drawings: Submit Shop Drawings indicating sealant joint locations, with full-size sealant joint details.
- B. Product Data: Submit manufacturer's literature for each sealant material.
- C. Material Samples: Submit Samples indicating color range available for each sealant material intended for installation in exposed locations.
- D. Certifications: Submit manufacturer's certification materials comply with requirements specified.
- E. Site Samples: At locations required, provide a Sample of sealant for each typical installation, approximately 24 inches long, including joint preparation, backing, sealant and tooling. Allow backing to extend 6 inches beyond end of sealant for inspection of substrate.
- F. Test Reports: Submit manufacturer's adhesion compatibility test reports according to ASTM C794 for each substrate.

**1.3 QUALITY ASSURANCE**

- A. Qualifications of Installer: The Work of this section shall be installed by a firm which has been in the business of installing similar materials for at least five consecutive years; and can show evidence of satisfactory completion of five projects of similar size and scope. Installer shall have applicators trained and approved by manufacturer for performing this Work.

**1.4 DELIVERY, STORAGE AND HANDLING**

- A. Store in accordance with manufacturer's recommendations. Provide a uniform ambient temperature between 60- and 80-degrees F.

**SECTION 07 9200  
JOINT SEALANTS**

1.5 WARRANTY

- A. Manufacturer: five-year material warranty.
- B. Installer: two-year installation/application warranty.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Furnish sealants meeting following in-service requirements:
  - 1. Normal curing schedules are permitted.
  - 2. Non-staining, color fastness (resistance to color change), and durability when subjected to intense actinic (ultraviolet) radiation are required.
- B. Furnish the products of only one manufacturer unless otherwise required, sealant colors as selected to match the adjoining surfaces.

2.2 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated into the work include the following:
  - 1. Bostik, Inc.
  - 2. Dow Corning.
  - 3. GE Silicones.
  - 4. Mameco International.
  - 5. W.R. Meadows, Inc.
  - 6. Nomaco, Inc.
  - 7. Pecora Corporation.
  - 8. Sika Corporation.
  - 9. Sonneborn Building Products Div. ChemRex, Inc.
  - 10. Tremco.
  - 11. USG Corp.
  - 12. Or approved equal.

2.3 MATERIALS

- A. Sealants:
  - 1. Sealant 1: Acrylic latex, one-part, non-sag, mildew resistant acrylic emulsion compound complying with ASTM C834, Type S, Grade NS, formulated to be paintable.
    - a. Tremco Inc., Acrylic Latex Caulk.
    - b. Pecora Corporation, AC-20.
    - c. Equal.

**SECTION 07 9200  
JOINT SEALANTS**

2. Sealant 2: Butyl sealant, one-part, non-sag, solvent-release-curing sealant complying with ASTM C1311, gun grade and formulated with a minimum of 75 percent solids.
    - a. Tremco Inc., Tremco Butyl Sealant.
    - b. Pecora Corp., BC-158.
    - c. Equal.
  3. Sealant 3: Silicone sealant, one-part non-acid-curing silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25.
    - a. Dow Corning Corp., Dow Corning 790, 791, 795.
    - b. General Electric Co., Silpruf.
    - c. Tremco, Inc., Spectrem 1.
    - d. Pecora Corp., 864.
    - e. Equal.
  4. Sealant 4: One-part mildew-resistant silicone sealant, complying with ASTM C920, Type S, Grade NS, Class 25.
    - a. Dow Corning Corp., Dow Corning 786.
    - b. General Electric Co., Sanitary 1700.
    - c. Tremco, Inc., Proglaze White.
    - d. Equal.
  5. Sealant 5: One-part non-sag urethane sealant, complying with ASTM C920, Type S, Grade NS, Class 25.
    - a. Sika Corporation, Sikaflex -221e.
    - b. Equal.
  6. Sealant 6: Multi-part pouring urethane sealant, complying with ASTM C920, Type M, Grade P, Class 25.
    - a. Sika Corporation, Sikaflex 2C NS/SL.
    - b. Equal.
  7. Sealant 7: Acoustical sealant, non-drying, non-hardening permanently flexible conforming to ASTM D217.
    - a. Pecora Corp., BA-98 Acoustical Sealant.
    - b. Equal.
- B. See 07 8413 - Penetration Firestopping for rated sealants.
- C. Joint Backing: ASTM D1056; round, closed cell Polyethylene Foam Rod; oversized 30 to 50 percent larger than joint width, reticulated polyolefin foam.
- D. Primer: Non-Staining Type. Provide primer as required and shall be product of manufacturer of installed sealant.

**SECTION 07 9200  
JOINT SEALANTS**

- E. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer.
- F. Sealants shall have normal curing schedules, shall be non-staining, color fast and shall resist deterioration due to ultraviolet radiation.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Verify that joint openings are ready to receive Work and field tolerances are within the guidelines recommended by sealant manufacturer.

**3.2 SURFACE PREPARATION**

- A. Joints and spaces to be sealed shall be completely cleaned of all dirt, dust, mortar, oil, and other foreign materials which might adversely affect sealing Work. Where necessary, degrease with a solvent or commercial degreasing agent. Surfaces shall be thoroughly dry before application of sealants.
- B. If recommended by the manufacturer, remove paint and other protective coatings from surfaces to be sealed before priming and installation of sealants.
- C. Preparation of surfaces to receive sealant shall conform to the sealant manufacturer's specifications. Provide air pressure or other methods to achieve required results. Provide masking tape to keep sealants off surfaces that will be exposed in finished Work.
- D. Etch concrete or masonry surfaces to remove excess alkalinity, unless sealant manufacturer's printed instructions indicate that alkalinity does not interfere with sealant bond and performance. Etch with 5 percent solution of muriatic acid; neutralize with dilute ammonia solution, rinse thoroughly with water and allow to dry before sealant installation.
- E. Perform preparation in accordance with ASTM C804 for solvent release sealants, and ASTM C962 for elastomeric sealants.
- F. Protect elements surrounding Work of this section from damage or disfiguration.

**3.3 SEALANT APPLICATION SCHEDULE**

	<u>Location</u>	<u>Type</u>	<u>Color</u>
A.	Exterior and Interior joints in horizontal surfaces of concrete; between metal and concrete masonry and mortar.	Sealant 6	To match adjacent material
B.	Exterior door, entrance and window frames. Exterior and interior vertical joints in concrete and masonry metal flashing.	Sealant 3 or 5	To match adjacent material
C.	Joints within glazed curtain wall	Sealant 3	Translucent or

**SECTION 07 9200  
JOINT SEALANTS**

	system. Skylight framing system. Aluminum entrance system glass and glazing.		Black
D.	Interior joints in ceramic tile and at plumbing fixtures.	Sealant 4	Translucent or White
E.	Under thresholds.	Sealant 2	Black
F.	All interior joints not otherwise, scheduled	Sealant 1	To Match Adjacent Surfaces
G.	Heads and sills, perimeters of frames and other openings in insulated partitions	Sealant 7	Match Adjacent Surfaces

**3.4 APPLICATION**

- A. Provide sealant around all openings in exterior walls, and any other locations indicated or required for structure weatherproofing and/or waterproofing.
- B. Sealants shall be installed by experienced mechanics using specified materials and proper tools. Preparatory Work (cleaning, etc.) and installation of sealant shall be as specified and in accordance with manufacturer's printed instructions and recommendations.
- C. Concrete, masonry, and other porous surfaces, and any other surfaces if recommended by manufacturer, shall be primed before installing sealants. Primer shall be installed with a brush that will reach all parts of joints to be filled with sealant.
- D. Sealants shall be stored and installed at temperatures as recommended by manufacturer. Sealants shall not be installed when they become too jelled to be discharged in a continuous flow from gun. Modification of sealants by addition of liquids, solvents, or powders is not permitted.
- E. Sealants shall be installed with guns furnished with proper size nozzles. Sufficient pressure shall be furnished to fill all voids and joints solid. In sealing around openings, include entire perimeter of each opening, unless indicated or specified otherwise. Where gun installation is impracticable, suitable hand tools shall be provided.
- F. Sealed joints shall be neatly pointed on flush surfaces with beading tool, and internal corners with a special tool. Excess material shall be cleanly removed. Sealant, where exposed, shall be free of wrinkles and uniformly smooth. Sealing shall be complete before final coats of paint are installed.
- G. Comply with sealant manufacturer's printed instructions except where more stringent requirements are indicated on Drawings or specified.
- H. Partially fill joints with joint backing material, furnishing only compatible materials, until joint depth does not exceed 1/2-inch joint width. Minimum

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JOINT SEALANTS**

joint width for metal-to-metal joints shall be 1/4 inch. Joint depth, shall be not less than 1/4 inch and not greater than 1/2 inch.

- I. Install sealant under sufficient pressure to completely fill voids. Finish exposed joints smooth, flush with surfaces or recessed as indicated. Install non-tracking sealant to concrete expansion joints subject to foot or vehicular traffic.
- J. Where joint depth prevents installation of standard bond breaker backing rod, furnish non-adhering tape covering to prevent bonding of sealant to back of joint. Under no circumstances shall sealant depth exceed 1/2 inch maximum, unless specifically indicated on Drawings.
- K. Prime porous surfaces after cleaning. Pack joints deeper than 3/4 inch with joint backing to within 3/4 inch of surface. Completely fill joints and spaces with gun applied compound, forming a neat, smooth bead.

**3.5 MISCELLANEOUS WORK**

- A. Sealing shall be provided wherever required to prevent light leakage as well as moisture leakage. Refer to Drawings for condition and related parts of Work.
- B. Install sealants to depths as indicated or, if not indicated, as recommended by sealant manufacturer but within following general limitations:
  - 1. For joints in concrete walks, slab and paving subject to traffic, fill joints to a depth equal to 75 percent of joint width, but not more than 3/4 inch deep or less than 3/8 inch deep, depending on jointwidth.
  - 2. For building joints, fill joints to a depth equal to 50 percent of joint width, but not more than 1/2 inch deep or less than 1/4 inch deep.

**3.6 CLEANING**

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

**3.7 CURING**

- A. Sealants shall cure in accordance with manufacturer's printed recommendations. Do not disturb seal until completely cured.

**3.8 PROTECTION**

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

**SECTION 08 51 13**

**ALUMINUM WINDOWS**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Aluminum windows
- B. Baked finish
- C. Hardware
- D. Weatherstripping
- E. Glazing
- F. Anchoring devices and fasteners
- G. Isolation coating
- H. Sealants

**1.02 RELATED SECTIONS**

- A. Section 01 33 00: Submittal Procedures
- B. Section 01 43 10: Project Quality Program Requirements - Design/Build or  
Section 01 43 20: Project Quality Program Requirements - Design/Bid/Build  
(as applicable)
- C. Section 01 66 00: Product Storage and Handling Requirements
- D. Section 07 92 00: Joint Sealants
- E. Section 08 01 57: Window Restoration and Replacement
- F. Section 08 80 00: Glazing

**1.03 REFERENCES**

- A. American Architectural Manufacturers Association (AAMA):
  - 1. AAMA 101 Voluntary Specifications for Aluminum and Poly (Vinyl Chloride)(PVC) Prime Windows and Sliding Glass Doors
  - 2. AAMA 2604 Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels
  - 3. AAMA 1503 Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall

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## Sections

### B. ASTM International (ASTM):

1. ASTM B 221 Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
2. ASTM E 283 Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors
3. ASTM E330 Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air
4. ASTM E331 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference

### C. Builders Hardware Manufacturers Association (BHMA):

1. BHMA-A156.18-Materials and Finishes

### D. California Code of Regulations (CCR): Title 24, Part 2 – California Building Code (CBC).

## 1.04 QUALITY ASSURANCE

### A. Comply Project Quality Program Requirements (see 1.02 above).

### B. Manufacturer and Applicator/Installer Qualifications:

1. Manufacturer's Qualifications: Minimum of 5 years experience in manufacturing of specified materials/products, with record of successful in-service performance.
2. Applicator/Installer Qualifications: Engage applicator/installer with minimum 5 years experience in installation of materials/products similar in material, design, and to extent indicated for this Project.
  - a. Installer Certification: Obtain written certification from manufacturer, certifying that installer is approved by, licensed, or certified by manufacturer for installation of specified materials/products or systems.
  - b. Provide list of minimum 5 projects similar in nature and size to that of this Project, where specified materials/products have been successfully installed/used

### C. Test Units:

1. Air, water, and structural test unit sizes and configuration conforming to requirements of ANSI/AAMA 101.
2. Thermal Test Unit Sizes: 4 feet by 6 feet, consisting of single typical vent.

### D. Refer to Article 2.03 for performance requirements.

## 1.05 SUBMITTALS

### A. Refer to Section 01 33 00 - Submittal Procedures, for submittal requirements and procedures.

### B. Shop Drawings: Show materials, sizes and shapes of members, details of fabrication and installation, and finish hardware.

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- C. Product Data: Window manufacturer's product data, including illustrative photos (catalog cuts) of windows, operating and locking hardware, and color chart for selection of coating color.
- D. Samples: 3 feet by 4 feet sample of operable unit, of materials, finish and color specified; include polycarbonate glass, glazing, and hardware.
- E. Test Reports: Test reports from AAMA accredited laboratories certifying specified performance. Furnish with specified certification.
- F. Certification: AAMA Notice of Certification stating that tested window meets or exceeds referenced criteria for AAMA 101 window type specified.
- G. Material Safety Data Sheets (MSDS): Manufacturer's Material Safety Data Sheet for each type of material used in Work.

#### **1.06 DEFINITIONS**

- A. VOC: Volatile Organic Compound, as defined in SCAQMD Rule 102 – Definition of Terms:
  - 1. Any volatile compound of carbon, excluding methane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, ammonium carbonate and exempt compounds.
- B. SCAQMD: South Coast Air Quality Management District

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Refer to Section 01 66 00 – Product Storage and Handling Requirements, for general requirements for delivery, storage, and handling procedures.
- B. Do not allow windows or components to come in contact with mud, uncured concrete, materials that with the presence of moisture could cause staining of finish, and other materials that could damage windows or their finish.

#### **1.08 WARRANTY**

- A. Furnish warranties below in form acceptable to Metro or its designee.
  - 1. Total Window System:
    - a. Warrant for three years satisfactory performance of total window installation, including windows, hardware, glass, glazing, anchorage and setting system, sealing, flashing, and associated items as it relates to air, water, and structural adequacy specified and indicated on approved Shop Drawings
    - b. Correct deficiencies due to elements not meeting specified requirements at Contractor's expense during warranty period.
  - 2. Finish Coating: Warrant specified finish coating for five years for film integrity, and against color fade and chalking.

#### **1.09 REGULATORY REQUIREMENTS**

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- A. In addition to foregoing referenced standards, regulatory requirements that govern work of this Section include following governing codes:
1. Title 24, Part 2 - California Building Code (CBC), Chapter 24, "Glass and Glazing.
  2. Title 24, Part 6 - California Energy Code (CEC), applicable requirements.

## **PART 2 - PRODUCTS**

### **2.01 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include, but are not limited to, following:
1. Arcadia, Inc.
  2. EFCO Corporation
  3. Graham Architectural Products
  4. Wausau Window and Wall Systems
  5. Winco Window Company
  6. Approved Equivalent

### **2.02 MATERIALS AND FABRICATION**

- A. Window Type: Monumental operable and fixed sash aluminum windows, as indicated, meeting requirements of AAMA 101, with baked fluoropolymer finish.
- B. Aluminum: ASTM B221, 6063-T5 alloy and temper, extrusions of sizes indicated and thickness required to meet specified design and performance requirements.
1. Extrusions:
    - a. Minimum wall thickness shall be 0.125 inches.
    - b. Depth of frame and sash shall be 2 7/16-inches minimum.
  2. Frame Components: Mitered, reinforced with aluminum angle, and welded.
  3. Sash:
    - a. Extrusions shall be tubular.
    - b. Miter each corner, reinforce with extruded aluminum corner key, hydraulically crimp, and "cold-weld" with epoxy adhesive.
    - c. Provide each operable sash with two rows of neoprene weatherstrip installed in specially designed dovetail grooves in sash extrusion.
      - 1) Fully weatherstrip window units and operable vents in accordance with manufacturer's standards
  4. Internal Components: Manufacturer's standard stainless steel or other corrosion-resistant materials compatible with aluminum extrusions.
- C. Baked Fluoropolymer Finish: Full 70 percent polyvinylidene fluoride finish.
1. Only coatings based on fluoropolymer resins meeting requirements of AAMA

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- 2604 will be accepted.
2. Color: Selected by Metro or its designee from manufacturer's standards.
    - a. Shop apply baked fluoropolymer finish to exposed aluminum surfaces
- D. Hardware:
1. Operating Handles: Provide cam type locking handles, manufactured from white bronze alloy with BHMA 626 satin chrome finish.
    - a. Furnish Allen keyed custodial lock and concealed limit stop.
  2. Operating Arms: Provide pivot vents with extruded aluminum pivot housing with stainless steel pin.
- E. Weather stripping: Neoprene, for use between frame and vent.
- F. Glazing: Factory glaze sash with clear, insulating glass of type specified in Section 08 80 00 – Glazing.
1. Wet glaze units with extruded aluminum snap-in glazing bead and PVC bulb on interior of glass.
  2. Set exterior glass continuous bead of silicone sealant.
  3. Provide for expansion and contraction of acoustical glass where occurring
- H. Anchoring Devices and Fasteners: Aluminum or stainless steel when exposed, cadmium- or zinc-plated steel when concealed.
- I. Sealants: Refer to Section 07 92 00 – Joint Sealants for requirements.
- J. Isolation Coating:
1. Single-Component, inert-type non-corrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities; VOC compliant.
  2. Elasto-Deck BT as manufactured by Pacific Polymers division of ITW, or equivalent product acceptable to Metro or its designee.
- I. Anchorage Devices and Fasteners: Tempered aluminum or 300 Series stainless steel when exposed; cadmium or zinc plated when concealed.

## **2.03 PERFORMANCE**

- A. Test Procedures and Performance: Conform to AAMA 101 requirements for window types specified.
1. Provide windows meeting following performance requirements:
    - a. Air Infiltration Test:
      - 1) With window sash and ventilators closed and locked, test unit in accordance with ASTM E283 at static air pressure difference of 6.24 pounds per square foot.
      - 2) Air infiltration does not exceed 10 cubic feet per minute per foot of perimeter crack length.

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2. Water Resistance Test:
    - a. With window sash and ventilators closed and locked, test unit in accordance with ASTM E331 at static air pressure difference of 7.50 pounds per square foot.
    - b. No uncontrolled water leakage.
  3. Uniform Load Structural Test:
    - a. With window sash and ventilators closed and locked, test unit in accordance with ASTM E330 at a static air pressure difference of 80 pounds per square foot positive pressure and 80 pounds per square foot negative pressure.
    - b. At conclusion of test, no glass breakage, permanent damage to fasteners, hardware parts, support arms, or actuating mechanisms, nor other damage that would cause window to be inoperable or otherwise defective.
  4. Condensation Resistance Test (CRF):
    - a. With window sash and ventilators closed and locked, test unit in accordance with AAMA 1503.
    - b. Condensation Resistance Factor: Not less than 51.
  5. Thermal Transmittance Test (Conductive U-value):
    - a. With window sash and ventilators closed and locked, test unit in accordance with AAMA 1503.
    - b. Conductive thermal transmittance (U-value): Not more than 60 BTU per hour per degree F per square foot.
- B. Drainage: Design window to enable water entering or occurring within system to drain to exterior.

## **PART 3 – EXECUTION**

### **3.01 PREPARATION**

- A. Where aluminum is installed in contact with dissimilar metals, concrete, masonry, or stucco, paint aluminum with specified isolation coating or separate with neoprene or butyl tape.
- B. Clean aluminum surfaces in contact with sealants with solvent or other material complying with requirements of Section 07 92 00 – Joint Sealants, and sealant manufacturer and compatible with sealants and primers.

### **3.02 INSTALLATION**

- A. Install windows were indicated in accordance with approved shop drawing, and window manufacturer's installation instructions and recommendations.
- B. Plumb and align window faces in single plane for each wall plane, and install windows square and true, adequately anchored to maintain positions permanently when subjected to normal thermal and building movement and specified wind loads.

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- C. Calk and seal windows completely around their perimeters with sealant and tape as required.

### **3.03 ADJUSTING**

- A. Adjust ventilators and associated hardware to operate smoothly, to provide tight fit at contact points and weather stripping, and to meet specified performance requirements; following adjustment, leave operable units in closed position.
- B. Apply sealant at joints and intersections and at opening perimeters; wipe off excess material and leave exposed surfaces and joints clean and smooth.
- C. Upon completion of installation, inspect, adjust windows and put operable units into proper working order to operate smoothly; ensure units are weather tight in accordance with specification.

### **3.04 CLEANING**

- A. Clean exterior and interior faces of windows free of labels, dirt, and other adhering foreign materials, using cleaning materials and methods recommended by window and glass manufacturers.

**END OF SECTION 08 51 13**

NOT FOR BID

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**SECTION 08 1113  
HOLLOW METAL DOORS AND FRAMES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Hollow Metal frames.
  
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
  
- C. Related Sections:
  - 1. Section 08 1416 – Wood Doors.
  - 2. Section 08 7100 - Door Hardware: Hardware coordination.
  - 3. Section 09 9123 – Interior Painting: Field painting and finishing of doors and frames.

**1.2 REFERENCES**

- A. American Society for Testing and Materials (ASTM):
  - 1. ASTM A 152 - Methods for Fire Tests of Door Assemblies.
  - 2. ASTM A 653/A 653M - Standard Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 1996.
  
- B. Door Hardware Institute (DHI):
  - 1. DHI - The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.
  - 2. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware.
  
- C. Steel Door Institute (SDI):
  - 1. SDI-100 - Recommended Specifications Standard Steel Doors and Frames.
  - 2. SDI-105 - Recommended Erection Instructions for Steel Frames.

**1.3 SUBMITTALS**

- A. Section 01 3300 - Submittal Procedures: Procedures for submittals.
  - 1. Product Data: Indicate door materials, gauges, configurations, and location of cut-outs hardware reinforcement, and finish.

**SECTION 08 1113  
HOLLOW METAL DOORS AND FRAMES**

- a. Shop Drawings: Indicate door elevations, internal reinforcement, closure method, and cut-outs for louvers.

**1.4 DELIVERY, STORAGE AND PROTECTION**

- A. Section 01 6000 - Product Requirements: Transport, handle, store, and protect products.
- B. Protect doors and frames with resilient packaging.
- C. Break seal on-site to permit ventilation.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Doors and frames shall be products of a single manufacturer.
- B. Subject to compliance with project requirements, manufacturers offering items which may be incorporated in the Work include the following:
  - 1. Amweld Building Products, Incorporated,
  - 2. Ceco Door Products,
  - 3. Curries Company,
  - 4. Security Metal Products
  - 5. Steelcraft,
  - 6. Timely Industries
  - 7. Or approved equal.

**2.2 MATERIALS**

- A. Steel:
  - 1. Exterior Frames: 14 gage, cold-rolled steel, mitered and welded, 2-inch profile, for installation in a metal or wood stud and gypsum board partition.
  - 2. Interior Frames: 16-gauge steel knock down S-series Frames with Trim for installation in wood stud gypsum board partitions. Commercial quality Carbon Steel ASTM A1008.
  - 3. Steel shall be free of scale, pitting, coil breaks or other surface blemishes, and free of buckles, waves, or other defects.
  - 4. Steel thicknesses expressed in steel gages (MSG) is for reference only. Actual steel thicknesses must meet minimum requirements of ASTM standards and as described in ANSI/SDI A250.8.



**SECTION 08 1113  
HOLLOW METAL DOORS AND FRAMES**

- b. Anchors in masonry construction: Provide manufacturers standard jamb anchors. Steel wire complying with ASTM A510, 0.177 inch in diameter, may be furnished.
  - c. Anchors in Stud Partitions: Provide steel anchors, 16 gage minimum sheet steel, of design to suit partition construction, securely welded inside each jamb.
  - d. Through-Frame Anchors: At frames indicated to be anchored with bolts through frame, provide countersunk holes for bolts with 16-gauge minimum sheet steel stiffeners full thickness of frame, and securely welded inside each frame at each hole.
- D. Inserts, Bolts, and Fasteners: Provide manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A153 Class C or D as required.
- E. Head Reinforcing: Refer to Detail #2 of this section. Reinforcing shall not function as lintel or load-carrying member and shall comply with fire rating requirements. Provide frames regardless of whether a closer is called for.
- F. Hardware Reinforcement and Accessories:
- 1. Butt Hinge: 7 gage minimum.
  - 2. Head assemblies: Reinforced internally with, full length, 10 gage angles on each side of frame and bar at bottom of stop for closer reinforcement in frames as shown in Detail #2 of this section.
  - 3. Reinforcing for other items of finish hardware shall be accomplished according to ANSI A250.6.
  - 4. Plaster Guards: Provide 26 gage galvanized steel plaster guards or dust cover boxes, welded to frame, at back of finish hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.
  - 5. Door Silencers: Except for exterior doors, drill, and punch frames for three silencers at lock jamb of single swing doors or in double doors with astragal and one silencer per leaf in heads of doubled door frames.

**2.4 ACCESSORIES**

- A. Rubber Silencers: Resilient rubber.

**SECTION 08 1113  
HOLLOW METAL DOORS AND FRAMES**

**2.5 PROTECTIVE COATINGS**

- A. Bituminous Coating: Fibered asphalt emulsion.
- B. Primer: Exposed surfaces shall be cleaned, treated with Bonderite chemical, and given one baked-on shop coat of grey rust inhibiting primer.

**2.6 FABRICATION**

- A. Fabricate units rigid, neat, and free from warp or buckle. Fabricate KD. Weld exposed joints continuously; grind, dress, and make smooth, flush, and invisible.
- B. Reinforce units to receive surface applied finish hardware.
- C. Prepare frame for silencers. Provide three single rubber silencers for single doors and two single silencers on frame head at double doors without mullions.
- D. Primer: Air dried.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Section 01 7300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates, and conditions are as required, and ready to receive Work.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the County.

**3.2 INSTALLATION**

- A. Install frames in accordance with SDI-105.
- B. Install doors in accordance with DHI.

**SECTION 08 1113  
HOLLOW METAL DOORS AND FRAMES**

- C. Install doors in accordance with manufacturer's published instructions, of size, and at locations indicated.
- D. Coordinate with adjacent wall construction for anchor placement.
- E. Field paint doors and frames as specified in Section 099100.
- F. The frame is to be mounted to the studding in such a manner to prevent a spreading of the frame from the studs of less than 1/2 inch.

**3.3 CONSTRUCTION**

- A. Interface with Other Work:
  - 1. Coordinate frame installation with size, location, and installation.
  - 2. Coordinate with door opening construction, door frame, and doorhardware installation.
- B. Site Tolerances:
  - 1. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

**3.4 FIELD QUALITY CONTROL**

- A. Section 01 4000 - Quality Requirements: Field inspection.
- B. Inspect metal door and frame installation, alignment, attachment to structure, and operation.

**3.5 ADJUSTING AND CLEANING**

- A. Adjust hardware for smooth and balanced door movement.
- B. Section 01 7300 - Execution: Cleaning installed Work.

Payment for items of work covered under Division 8 of the plans and these specifications shall be based on the lump sum bid pricing identified in the Bid Schedule. No additional compensation will be allowed.

END OF SECTION

**SECTION 08 7100  
DOOR HARDWARE**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
1. Door hardware, including electric hardware.
  2. Power supplies for electric hardware.
  3. Door position switches.
- B. Related Divisions:
1. Division 08 1416 – Wood Doors
  2. Division 08 4113 – Aluminum Entrances and Storefronts
- C. Specific Omissions: Hardware for the following is specified or indicated elsewhere.
1. Windows.
  2. Cabinets, including open wall shelving and locks.
  3. Signs.
  4. Toilet accessories, including grab bars.
  5. Installation.
  6. Rough hardware.
  7. Conduit, junction boxes & wiring.

**1.2 REFERENCES:**

- A. Use date of standard in effect as of Bid date.
1. American National Standards Institute
    - a) ANSI 156.18 – Materials and Finishes.
  2. BHMA – Builders Hardware Manufacturers Association
  3. 2014 California Building Code
    - a) Chapter 11B – Accessibility to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing
  4. DHI – Door and Hardware Institute
  5. NFPA – National Fire Protection Association
    - a) NFPA 80 2013 Edition – Standard for Fire Doors and Other Opening Protectives.
    - b) NFPA 105 – Smoke and Draft Control Door Assemblies
    - c) NFPA 252 – Fire Tests of Door Assemblies
  6. UL – Underwriters Laboratories
    - a) UL10C – Positive Pressure Fire Tests of Door Assemblies.
    - b) UL 305 – Panic Hardware

**SECTION 08 7100  
DOOR HARDWARE**

7. WHI – Warnock Hersey Incorporated State of California Building Code
8. Local applicable codes
9. SDI – Steel Door Institute
10. WI – Woodwork Institute
11. AWI – Architectural Woodwork Institute
12. NAAMM – National Association of Architectural Metal Manufacturers

**B. Abbreviations**

1. Manufacturers: see table at 2.1.A of this section
2. Finishes: see 2.8 of this section.

**1.3 SUBMITTALS & SUBSTITUTIONS**

**A. SUBMITTALS:** Submit six copies of schedule per D. Only submittals printed one sided will be accepted and reviewed. Organize vertically formatted schedule into “Hardware Sets” with index of doors and headings, indicating complete designations of every item required for each door or opening. Minimum 10pt font size. Include following information:

1. Type, style, function, size, quantity, and finish of hardware items.
2. Use BHMA Finish codes per ANSI A156.18.
3. Name, part number and manufacturer of each item.
4. Fastenings and other pertinent information.
5. Location of hardware set coordinated with floor plans and door schedule.
6. Explanation of abbreviations, symbols, and codes contained in schedule.
7. Mounting locations for hardware.
8. Door and frame sizes, materials, and degrees of swing.
9. List of manufacturers used and their nearest representative with address and phone number.
10. Catalog cuts.
11. Point-to-point wiring diagrams.
12. Manufacturer’s technical data and installation instructions for electronic hardware.
13. Date of jobsite visit.

**B.** Bid and submit manufacturer’s updated/improved item if scheduled item is discontinued.

**C.** Deviations: Highlight, encircle or otherwise identify deviations from “Schedule of Finish Hardware” on submittal with notations clearly designating those portions as deviating from this section.

**SECTION 08 7100  
DOOR HARDWARE**

- D. If discrepancy between drawings and scheduled material in this section, bid the more expensive of the two choices, note the discrepancy in the submittal and request direction from Architect for resolution.
- E. Substitutions per Division 1. Include product data and indicate benefit to the Project. Furnish operating samples on request.
- F. Furnish as-built/as-installed schedule with closeout documents, including keying schedule, riser and point-to-point wiring diagrams, manufacturers' installation, adjustment and maintenance information, and supplier's final inspection report.

**1.4 QUALITY ASSURANCE:**

- A. Qualifications:
  - 1. Hardware supplier: direct factory contract supplier who employs a certified architectural hardware consultant (AHC), available at reasonable times during course of work for project hardware consultation to Owner, Architect and Contractor.
    - a) Responsible for detailing, scheduling, and ordering of finished hardware. Detailing implies that the submitted schedule of hardware is correct and complete for the intended function and performance of the openings.
- B. Hardware: Free of defects, blemishes, and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges, and closers) from one manufacturer.
- C. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.
- D. Fire-Rated Openings: NFPA 80 complaint. Hardware UL10C (positive pressure) compliant for given type/size opening and degree of label. Provide proper latching hardware, non-flaming door closers, approved-bearing hinges, and resilient seals. Coordinate with wood door section for required intumescent seals. Furnish openings complete.
- E. Furnish hardware items required to complete the work in accordance with specified performance level and design intent, complying with manufacturers' instructions and code requirements.
- F. Pre-Installation Meetings: Initiate and conduct with supplier, installer and related trades, coordinate materials and techniques, and sequence complex hardware items and systems installation. Include manufacturers' representatives of locks, panic hardware and door closers in the meetings. Convene prior to commencement of related work.

**SECTION 08 7100  
DOOR HARDWARE**

**1.5 DELIVERY, STORAGE AND HANDLING:**

- A. Delivery: coordinate delivery to appropriate locations (shop or field).
  - 1. Permanent keys and cores: secured delivery direct to Owner's representative.
- B. Acceptance at Site: Items individually packaged in manufacturers' original containers, complete with proper fasteners and related pieces. Clearly mark packages to indicate contents, locations in hardware schedule and door numbers.
- C. Storage: Provide securely locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, dust, excessive heat and cold, etc.

**1.6 PROJECT CONDITIONS AND COORDINATION:**

- A. Where exact types of hardware specified are not adaptable to finished shape or size of members requiring hardware, provide suitable types having as practical the same operation and quality as type specified, subject to Architect's approval.
- B. Coordination: Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security, and similar requirements indicated, as necessary for proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents. Furnish related trades with the following information:
  - 1. Location of embedded and attached items to concrete.
  - 2. Location of wall-mounted hardware, including wall stops.
  - 3. Location of finished floor materials and floor-mounted hardware.
  - 4. At masonry construction, coordinate with the anchoring and hollow metal supplier prior to frame installation by placing a strip of insulation, wood, or foam, on the back of the hollow metal frame behind the rabbet section for continuous hinges, as well as at rim panic hardware strike locations, silencers, coordinators, and door closer arm locations. When the frame is grouted in place, the backing will allow drilling and tapping without dulling or breaking the installer's bits.
  - 5. Locations for conduit and raceways as needed for electrical, electronic, and electro-pneumatic hardware items. Fire/life-safety system interfacing. Point-to-point wiring diagrams plus riser diagrams to related trades.
  - 6. Coordinate: low-voltage power supply locations.
  - 7. Coordinate: back-up power for doors with automatic operators.
  - 8. Coordinate: flush top rails of doors at out swinging exteriors, and throughout where adhesive-mounted seals occur.

**SECTION 08 7100  
DOOR HARDWARE**

- 9. Manufacturers' templates to door and frame fabricators.
- C. Check Shop Drawings for doors and entrances to confirm that adequate provisions will be made for proper hardware installation.
- D. Environmental considerations: segregate unused recyclable paper and paper product packaging, uninstalled metals, and plastics, and have these sent to a recycling center.
- E. Prior to submittal, carefully inspect existing conditions to verify finished hardware required to complete Work, including sizes, quantities, existing hardware scheduled for re-use, and sill condition material. If conflict between the specified/scheduled hardware and existing conditions, submit a request for direction from Architect. Include date of jobsite visit in the submittal.
  - 1. Submittals prepared without a thorough jobsite visit by a qualified hardware expert will be rejected as non-compliant.

**1.7 WARRANTY:**

- A. Part of respective manufacturers' regular terms of sale. Provide manufacturers' written warranties.
- B. Include factory order numbers with close-out documents to validate warranty information, required for Owner in making future warranty claims:
  - 1. Minimum warranties:
    - a) Locksets: Three years
    - b) Extra Heavy-Duty Cylindrical Lock: Seven Years
    - c) Exit Devices: Three years mechanical  
One year electrical.
    - d) Closers: Thirty years mechanical  
Two years electrical
    - e) Hinges: One year
    - f) Other Hardware Two years

**1.8 COMMISSIONING:**

- A. Conduct these tests prior to request for certificate of substantial completion:
  - 1. With the installer present, test door hardware operation with climate control system and stairwell pressurization system both at rest and while in full operation.

**SECTION 08 7100  
DOOR HARDWARE**

2. With the installer, access control contractor and electrical contractor present, test electrical, electronic, and electro-pneumatic hardware systems for satisfactory operation.
3. With installer and electrical contractor present, test hardware interfaced with fire/life-safety system for proper operation and release.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS:**

**A. Manufacturers and their abbreviations used in this schedule:**

FAL	Falcon
GLY	Glynn-Johnson Hardware
IVE	H. B. Ives
LCN	LCN Closers
SCE	Schlage Electronics
SCH	Schlage Lock Company
VON	Von Duprin
ZER	Zero International

**2.2 HINGING METHODS:**

- A. Drawings typically depict doors at 90 degrees. Doors will swing to maximum allowable. Use wide-throw conventional or continuous hinges as needed up to 8 inches in width to allow door to stand parallel to wall for true 180-degree opening. Advise architect if 8-inch width is insufficient.
- B. Conform to manufacturer's published hinge selection standard for door dimensions, weight, and frequency, and to hinge selection as scheduled. Where manufacturer's standard exceeds the scheduled product, furnish the heavier of the two choices, notify Architect of deviation from scheduled hardware.
- C. Conventional Hinges: Steel or stainless-steel pins and approved bearings. The hinge opens widths minimum, but of sufficient throw to permit maximum door swing.
  1. Out swinging exterior doors: non-ferrous with non-removable (NRP) pins and security studs.
  2. Non-ferrous material exteriors and at doors subject to corrosive atmospheric conditions.

**SECTION 08 7100  
DOOR HARDWARE**

**2.3 LOCKSETS, LATCHSETS, DEADBOLTS:**

- D. Extra Heavy-Duty Cylindrical Locks and Latches: as scheduled.
1. Chassis: cylindrical design, corrosion-resistant plated cold-rolled steel, through-bolted.
  2. Locking Spindle: stainless steel, integrated spring, and spindle design.
  3. Latch Retractors: forged steel. Balance of inner parts: corrosion-resistant plated steel, or stainless steel.
  4. Latchbolt: solid steel.
  5. Backset: 2.75 inches typically, as needed to accommodate frame, door, or other hardware.
  6. Lever Trim: accessible design, independent operation, spring-cage supported, minimum 2.00 inches clearance from lever mid-point to door face.
  7. Electric operation: Manufacturer-installed continuous duty solenoid.
  8. Strikes: 16 gage curved steel, bronze or brass with 1.00-inch-deep box construction, lips of sufficient length to clear trim and protect clothing.
  9. Lock Series and Design: Schlage D series, "Rhodes" design.
  10. Certifications:
    - a) ANSI A156.2, 1994, Series 4000, Grade 1.
    - b) UL listed for A label and lesser class single doors up to 4 feet x 8 feet.
  11. Accessibility: Require not more than 5 lb. to retract the latch bolt or deadbolt, or both, per CBC 2013 11B-404.2.7 and 11B-309.4.
- E. Standard Duty Cylindrical Locks and Latches: as scheduled.
1. Chassis: cylindrical design, corrosion-resistant plated cold-rolled steel, through-bolted.
  2. Locking Spindle: stainless steel, interlocking design.
  3. Latch Retractors: forged steel. Balance of inner parts: corrosion-resistant plated steel or stainless steel.
  4. Backset: 2.75 inches typically, as needed to accommodate frame, door, or other hardware.
  5. Lever Trim: accessible design, independent operation, spring-cage supported, minimum 2.00 inches clearance from lever mid-point to face of door.
  6. Lock Series and Design: Schlage AL series, "Saturn" design.
  7. Certifications:
    - a) ANSI A156.2, 1994, Series 4000, Grade 2.

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- b) UL listed for A label and lesser class single doors up to 4 feet x 8 feet.
- 8. Accessibility: Require not more than 5 lb. to retract the latch bolt or deadbolt, or both, per CBC 2013 11B-404.2.7 and 11B-309.4.

**2.4 EXIT DEVICES / PANIC HARDWARE**

**A. General features:**

- 1. Independent lab-tested 1,000,000 cycles.
- 2. Push-through push-pad design. No exposed push-pad fasteners, no exposed cavities when operated. Return stroke fluid dampeners and rubber bottoming dampeners, plus anti-rattle devices.
- 3. Deadlocking latch bolts, 0.75-inch projection.
- 4. End caps: impact-resistant, flush-mounted. No raised edges or lips to catch carts or other equipment.
- 5. No exposed screws to show through glass doors.
- 6. Non-handed basic device design with center case interchangeable with all functions, no extra parts required to effect change of function.
- 7. Releasable in normal operation with 15-pound maximum operating force per UBC Standard 10-4, and with 32-pound maximum pressure under 250-pound load to the door.
- 8. Exterior doors scheduled with XP-series devices: Static load force resistance of at least 2000 pounds.
- 9. Accessibility: Require not more than 5 lb. to retract the latch bolt, per CBC 2013 11B-404.2.7 and 11B-309.4.
  - a) Mechanical method: Von Duprin "AX- "feature, where touchpad directly retracts the latch bolt with 5 lb. or less of force.
  - b) Electrical method: Von Duprin's "RX-QEL- "where lightly pressing the touchpad with 5 lb. or less of force closes an electric switch, activating quiet electric latch retraction.

**B. Specific features:**

- 1. Non-Fire Rated Devices: cylinder dogging.
- 2. Lever Trim: breakaway type, forged brass, or bronze escutcheon min. 0.130-inch thickness, compression spring drive, match lockset lever design.
- 3. Rod and latch guards with sloped full width kickplates for doors fitted with surface vertical rod devices with bottom latches.
- 4. Fire-Labeled Devices: UL label indicating "Fire Exit Hardware." Vertical rod devices less bottom rod (LBR) unless otherwise scheduled.

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5. Impact recessed devices: 1.25-inch projection when push-pad is depressed. Sloped metal end caps to deflect carts, etc. No pinch points to catch skin between touch bar and door.
6. Delayed Egress Devices: Function achieved within single exit device component, including latch, delayed locking device, request-to-exit switch, nuisance alarm, remote alarm, key switch, indicator lamp, relay, internal horn, door position input, external inhibit input plus fire alarm input. NFPA 101 "Special Locking Arrangement" complaint.
7. Electrically Operated Devices: Single manufacturer source for electric latch retraction devices, electrically controlled trim, power transfers, power supplies, monitoring switches and controls.
8. Removable Mullions: Removable with single turn of building key. Securely reinstalled without need for key. Furnish storage brackets for securely stowing the mullion away from the door when removed.

C. Surface Closers: [1461]

1. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast-iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.
2. ISO 2000 certified. Units stamped with date-of-manufacture code.
3. Independent lab-tested 5,000,000 cycles.
4. Non-sized, non-handed and adjustable. Place closer inside the building, stairs, and rooms.
5. Plates, brackets, and special templating when needed for interface with a particular header, door and wall conditions and neighboring hardware.
6. Adjust doors to open with not more than 5.0-pounds pressure to open at exterior doors and 5.0-pounds at interior doors. As allowed per 2013 California Building Code Section 11B-404.2.9, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15-pounds.
7. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.
8. Extra-duty arms (EDA) at exterior doors scheduled with parallel arm units.
9. Exterior door closers: tested to 100 hours of ASTM B117 salt spray test, furnish data on request.
10. Exterior doors: seasonal adjustments not required for temperatures from 120 degrees F to 0 degrees F, furnish checking fluid data on request.
11. Non-flaming fluid will not fuel door or floor covering fires.
12. Pressure Relief Valves (PRV) not permitted.

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**2.7 OTHER HARDWARE**

- A. Automatic Flush Bolts: Low operating force design.
- B. Overhead Stops: Non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.
- C. Kick Plates: Four beveled edges, .050 inches minimum thickness, height, and width as scheduled. Sheet-metal screws of bronze or stainless steel to match other hardware.
- D. Doorstops: Provide stops to protect walls, casework, or other hardware.
  - 1. Unless otherwise noted in Hardware Sets, provide floor type with appropriate fasteners. Where floor type cannot be used, provide wall type. If neither can be used, provide overhead type.
  - 2. Locate overhead stops for maximum opening. Consult with Owner for furniture locations. Minimum: 90deg stop / 95deg dead stop. Note degree of opening in submittal.
- E. Sound-reducing adjustable seals: coordinate lockset backsets, rim exit device strikes, and parallel arm closers. Fabricate 7ga "Z"-brackets as bridging pieces to facilitate installation. Brackets: mild carbon steel, or stainless steel.
- F. Automatic door bottoms: low operating force units. Doors with automatic door bottoms plus head and jamb seals cannot require more than two pounds operating force to open when the closer is disconnected.
  - 1. Include automatic type door bottoms, as opposed to fixed sweeps, at stairs and elevator lobbies to allow fine-tuning of pressurization systems.
- G. Thresholds: As scheduled and per details. Comply with CBC 2013 11B-404.2.5. Substitute products: certify that the products equal or exceed specified material's thickness. Proposed substitutions: submit for approval.
  - 2. Saddle thresholds: 0.125 inches minimum thickness.
  - 3. Exteriors: Seal perimeter to exclude water and vermin. Use sealant complying with requirements in Division 7 "Thermal and Moisture Protection". Minimum 0.25-inch diameter fasteners and lead expansion shield anchors, or Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors. National Guard Products' "COMBO" or Pemko Manufacturing's "FHSL."

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4. Fire-rated openings, 90-minutes or less duration: use thresholds to interrupt floor covering material under the door where that material has a critical radiant flux value less than 0.22 watts per square centimeter, per NFPA 253. Use threshold unit as scheduled. If none scheduled, include a 0.25in high 5in wide saddle in the bid, and request direction from Architect.
  5. Fire-rated openings, 3-hour duration: Thresholds, where scheduled, to extend full jamb depth.
  6. Acoustic openings: Set units in full bed of Division-7-compliant, leave no air space between threshold and substrate.
  7. Plastic plugs with wood or sheet metal screws are not an acceptable substitute for specified fastening methods.
  8. Fasteners: Exposed screws to be Phillips or Robertson drive. Pinned TORX drive at high security areas. Flat head sleeve anchors (FHSL) may be slotted drive. Sheet metal and wood screws: full thread. Sleeve nuts: full length to prevent door compression.
- H. Through-bolts: Do not use. Coordinate with wood doors; ensure provision of proper blocking to support wood screws for mounting panic hardware and door closers. Coordinate with metal doors and frames; ensure provision of proper reinforcement to support machine screws for mounting panic hardware and door closers.
1. Exception: surface-mounted overhead stops, holders, and friction stays.
- I. Silencers: Interior hollow metal frames, 3 for single doors, 4 for pairs of doors. Leave no unfilled/uncovered pre-punched silencer holes. Intent: door bears against silencers, seals make minimal contact with minimal compression – only enough to affect a seal.

**2.8 FINISH:**

- A. Generally: BHMA 626 Satin Chromium.
  1. Areas using BHMA 626: furnish push-plates, pulls and protection plates of BHMA 630, Satin Stainless Steel, unless otherwise scheduled.
- B. Door closers: factory powder coated to match other hardware, unless otherwise noted.
  1. Provide satin-chrome plated arms, tracks and covers where scheduled bright metallic powder coat (MTLPC) not available.

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DOOR HARDWARE**

**2.9 KEYING REQUIREMENTS:**

- A. Key System: existing Keying system. Initiate and conduct meeting(s) with Owner to determine system structure, furnish Owner's written approval of the system; do not order keys or cylinders without written confirmation of actual requirements from the Owner. Furnish temporary construction-keyed and permanent cylinders. Contractor to demonstrate to the Owner that temporary keys no longer operate the locking cylinders at the end of the project.

**PART 3 - EXECUTION**

**3.1 ACCEPTABLE INSTALLERS:**

- A. Can read and understand manufacturers' templates, suppliers' hardware schedule and printed installation instructions. Can readily distinguish drywall screws from manufacturers' furnished fasteners. Available to meet with manufacturers' representatives and related trades to discuss installation of hardware.

**3.2 PREPARATION:**

- A. Ensure that walls and frames are square and plumb before hardware installation. Make corrections before commencing hardware installation. Installation denotes acceptance of wall/frame condition.
- B. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.
  - 1. Notify Architect of code conflicts before ordering material.
  - 2. Locate latching hardware between 34 inches to 44 inches above the finished floor, per California Building Code, Section 1008.1.9.2 and 11B-404.2.7.
  - 3. Locate panic hardware between 36 inches to 44 inches above the finished floor.
  - 4. Where new hardware is to be installed near existing doors/hardware scheduled to remain, match locations of existing hardware.
- C. Overhead stops before installing, determine proposed locations of furniture items, fixtures, and other items to be protected by the overhead stop's action.
- D. Existing frames and doors to be retrofitted with new hardware:

## **SECTION 08 7100 DOOR HARDWARE**

1. Field-verify conditions and dimensions prior to ordering hardware. Fill existing hardware cut outs not being reused by the new hardware. Remove existing hardware not being reused, return to Owner unless directed otherwise.
2. Remove existing floor closers not scheduled for reuse, fill cavities with non-shrinking concrete and finish smoothly.
3. Cut and weld existing steel frames currently prepared with 2.25-inch height strikes. Cut an approximate 8-inch section from the strike jamb and weld in a reinforced section to accommodate specified hardware's strike.
4. Patch and weld flush filler pieces into existing door hardware preparations in steel doors and frames, leave surfaces smooth.
5. Glue in solid wood block fillers to fill cut outs in existing wood doors, sand surfaces smooth. Alternatively, use an approved epoxy-based wood filler product, submit product data for approval.

### **3.3 INSTALLATION**

- A. Install hardware per manufacturer's instructions and recommendations. Do not install surface-mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation. Remove and reinstall or replace work deemed defective by Architect.
  1. Gaskets: install jamb-applied gaskets before closers, overhead stops, rim strikes, etc.; fasten hardware over and through these seals. Install sweeps across bottoms of doors before astragals, cope sweeps around bottom pivots, trim astragals to tops of sweeps.
  2. When hardware is to be attached to existing metal surface and insufficient reinforcement exists, use RivNuts, NutSerts or similar anchoring device for screws.
  3. Use manufacturers' fasteners furnished with hardware items or submit Request for Substitution with Architect.
  4. Replace fasteners damaged by power-driven tools.
- B. Locate floor stops no more than 4 inches from walls and not within paths of travel. See paragraph 2.2 regarding hinge widths, door should be well clear of point of wall reveal. Point of door contact no closer to the hinge edge than half the door width. Where a situation is questionable or difficult, contact Architect for direction.
- C. Core concrete for exterior door stop anchors. Set anchors in approved non-shrink grout.

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- D. Locate overhead stops for minimum 90 degrees at rest and for maximum allowable degree of swing.
- E. Drill pilot holes for fasteners in wood doors and/or frames.
- F. Lubricate and adjust existing hardware scheduled to remain. Carefully remove and give to Owner items not scheduled for reuse.
- G. Field-verify existing conditions and measurements prior to ordering hardware. Fill existing hardware cut outs not being used by the new hardware.
- H. Remove existing hardware not being reused. Tag and bag removed hardware, turn over to Owner.
- I. Where existing wall conditions will not allow door to swing using the scheduled hinges, provide wide-throw hinges and if needed, extended arms on closers.
- J. Provide manufacturer's recommended brackets to accommodate the mounting of closers on doors with flush transoms.

**3.4. ADJUSTING**

- A. Adjust and check for proper operation and function. Replace units, which cannot be adjusted to operate freely and smoothly.
  - 1. Hardware damaged by improper installation or adjustment methods: repair or replace to Owner's satisfaction.
  - 2. Adjust doors to fully latch with no more than 1 pound of pressure.
    - a) Door closer valves: turn valves clockwise until at bottom – do not force. Turn valves back out one and one-half turns and begin adjustment process from that point. Do not force valves beyond three full turns counterclockwise.
  - 3. Adjust delayed-action closers on fire-rated doors to fully close from fully opened position in no more than 10 seconds.
  - 4. Adjust door closers per 1.9 this section.
- A. Inspection of fire door assemblies and means-of-egress panic-hardware doors: Per 2013 NFPA-80 5.2.1: hire an independent third-party inspection service to prepare a report listing these doors and include a statement that there are zero deficiencies with the fire-rated assemblies and the openings with panic hardware.
- B. Fire-rated doors:
  - 1. Wood doors: adjust to 0.125 inches clearance at heads, jambs, and meeting stiles.

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2. Steel doors: adjust to 0.063 inches minimum to 0.188 inches maximum clearance at heads, jambs, and meeting stiles.
  3. Adjust wood and steel doors to 0.75 inches maximum clearance (undercut) above threshold or finish floor material under door.
- C. Final inspection: Installer to provide letter to Owner that upon completion installer has visited the Project and has accomplished the following:
1. Has re-adjusted hardware.
  2. Has evaluated maintenance procedures and recommended changes or additions and instructed Owner's personnel.
  3. Has identified items that have deteriorated or failed.
  4. Has submitted a written report identifying problems.

**3.5 DEMONSTRATION:**

- A. Demonstrate mechanical hardware and electrical, electronic, and pneumatic hardware systems, including adjustment and maintenance procedures.

**3.6 PROTECTION/CLEANING:**

- A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion.
- B. Clean adjacent wall, frame and door surfaces soiled from installation / reinstallation process.

**3.7 SCHEDULE OF FINISH HARDWARE**

- A. See door schedule in drawings for hardware set assignments.
- B. Do not order material until submittal has been reviewed, stamped, and signed by Architect's door hardware consultant.

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**HARDWARE SET**

Hardware Group No. 001

For use on Door #(s):

1

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	SURFACE CLOSER	4111 H	626	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B4E	630	IVE
1	EA	PUSH PLATE	8200 6" x 16", ANTI-MICROBE	630	IVE
1	EA	PULL PLATE	8302-8 8" CTC	630	IVE
1	EA	WALL STOP	WS406/WS407 CVX	630	IVE
3	EA	SILENCER	SR64	GREY	IVE

Hardware Group No. 002

For use on Door #(s):

2

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB 1HW 4.5X4.5	652	IVE
1	EA	AUTOMATIC OPERATOR	8200 SERIES OPERATOR	626	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B4E	630	IVE
1	EA	SURFACE CLOSER	1461 SCUSH FC	689	LCN
1	EA	PUSH PLATE	8200 6" x 16", ANTI-MICROBE	630	IVE
1	EA	PULL PLATE	8302-8 8" CTC	630	IVE
1	EA	WALL STOP	WS406/WS407 CVX	630	IVE

Hardware Group No. 003

For use on Door #(s):

6

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB 1HW 4.5X4.5	652	IVE
1	EA	ENTRANCE/OFFICE	ND50TD RHO	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B4E	630	IVE
1	EA	SURFACE CLOSER	1461 SCUSH FC	689	LCN
1	EA	PUSH PLATE	8200 6" x 16", ANTI-MICROBE	630	IVE
1	EA	WALL STOP	WS406/WS407 CVX	630	IVE

**SECTION 08 7100  
DOOR HARDWARE**

END OF SECTION

**NOT FOR BID**

**SECTION 09 0565**  
**MOISTURE TESTING FOR FLOORING INSTALLATION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

**A. Section Includes:**

1. Moisture, alkali, and bond testing of existing and new concrete slabs on grade and elevated slabs scheduled to receive adhered flooring.

**B. Related Requirements:**

1. Division 01 - General Requirements.
2. Section 03 3000: Cast-in-Place Concrete; concrete slab curing.
3. Division 09 Finishes: Flooring Sections.

**1.2 REFERENCES**

**A. ASTM International (ASTM):**

1. ASTM D7234 – Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers.
2. ASTM F710 – Practice for Preparing Concrete Floors to Receive Resilient Flooring.
3. ASTM F1869 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
4. ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

**1.3 TESTING REQUIREMENTS**

**A. Perform the following tests:**

1. At new and existing concrete slabs on grade and below grade:
  - a. Moisture Vapor Emission Rate testing per ASTM F1869.
  - b. Relative Humidity testing per ASTM F2170.
  - c. pH testing per ASTM F710.
  - d. Bond testing per D7234 or manufacturer recommendations.

**1.4 SUBMITTALS**

**A. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; indicating:**

1. Moisture, humidity, and pH limits.

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**MOISTURE TESTING FOR FLOORING INSTALLATION**

2. Manufacturer's bond/compatibility test procedure.
- B. Test Report: Submit chart form with small scale floor plans showing the location of each test performed.
  1. Submit report for relative humidity test in accordance with ASTM F2170. Include pH, moisture vapor emission, and adhesion test results.
  2. Indicate areas where the test results exceed the floor covering manufacturer's limits and indicate proposed remediation procedures.

1.5 **QUALITY ASSURANCE**

- A. Tests indicated in this Section shall be performed by CONTRACTOR or a qualified independent testing agency retained and paid for by CONTRACTOR. OWNER may perform testing at its own expense to compare to CONTRACTOR's test results.
- B. Testing kits:
  1. Moisture-Vapor Emission: Prepackaged anhydrous calcium chloride test kits conforming to requirements of ASTM F-1869.
  2. Alkalinity: Calibrated digital pH meter in accordance with ASTM F-710.
  3. Relative Humidity: Relative humidity concrete moisture testing equipment conforming to ASTM F-2170.

1.6 **ENVIRONMENTAL CONDITIONS**

- A. Project areas to be tested shall be at the same temperature and humidity expected during normal use. These temperature and humidity levels shall be maintained for 48 hours prior to, and during the testing. If this is not possible, temperature and relative humidity ranges shall be within ranges indicated in the applicable ASTM test method.

**PART 2 – PRODUCTS – NOT USED**

**PART 3 - EXECUTION**

3.1 **PREPARATION**

- A. Testing shall take place after allowing concrete to dry for a minimum of 90 days.
- B. Prior to test placement, CONTRACTOR shall clean concrete slabs and have them free of foreign substances, such as residual adhesives, curing or hardening compounds, adhesive removers, sealers, paints, and other foreign materials that might prevent adhesive bond. These materials shall be removed not less than 24 hours prior to the placement of the test kits.

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Testing when floor coverings have never been installed may waive the 24-hour wait period.

- C. The test site temperature and humidity shall be in conformance with Article "Environmental Conditions."
- D. Minimum number of tests: For Moisture Vapor Emission Rate, Relative Humidity, and pH testing, provide three for the first 1,000 square feet of floor area, and at least one for each additional 1,000 square feet or fraction thereof.

**3.2 MOISTURE VAPOR EMISSION TESTING (MVEP)**

- A. MVEP testing shall be performed in accordance with ASTM F1869.
- B. Unless more stringent requirements are recommended by flooring manufacturer, the maximum allowable moisture release at time of flooring installation shall be three pounds per 24 hours per 1,000 square feet.
- C. Weigh test dish on site prior to start of test. The scale must report weight to 0.1 grams. Record weight and start time. Expose Calcium Chloride and set dish on concrete surface. Install test containment dome and allow test to proceed for 60 – 72 hours.
- D. Retrieve the test dish by carefully cutting through containment dome. Close and reseal test dish. Weigh test dish on site recording weight and stop time. Calculate and report results as "pounds of emission per 1,000 sq. ft. per 24 hours".
- E. In the event the MVEP value exceeds the value specified in this Article and the flooring manufacturer recommended limits, CONTRACTOR shall propose remediation to OWNER. In new concrete slab construction, remediation shall be at no cost to the OWNER.

**3.3 RELATIVE HUMMIDITY TESTING**

- A. Relative humidity testing shall be performed in conformance with ASTM F2170.
- B. Choose test areas where high moisture levels are suspected. Holes in new concrete slabs may be cast or drilled. Depth of holes shall be 40% of slab thickness for slabs drying only from the top, and 20% when drying from top and bottom, as indicated on ASTM F2170. Determine the concrete thickness of each type of slab to be tested and calculate depth of holes.
  - 1. The hole shall be drilled dry; do not use water for cooling or lubrication. Drill holes in the concrete and insert test liners. The hole shall not be more than 0.04 inches, or one millimeter, larger than the test liner.
  - 2. Before placing concrete, secure liner tube to formwork or steel reinforcing to avoid displacement during concrete placement,

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**MOISTURE TESTING FOR FLOORING INSTALLATION**

consolidation, and finishing. Secure a solid rod into the liner and protrude slightly above the top of the liner to exclude fresh concrete from entering the liner.

- C. Clean the area around the hole with a vacuum cleaner and vacuum the dust out of the hole. Immediately, set the sleeve by tapping the sleeve into the hole with a hammer or mallet.
- D. Remove the sleeve plug and place probe into the sleeve assuring that it reaches the bottom of the test hole. Connect the probe lead wire to the meter and turn the meter on. Allow time for the probe to sit in the test sleeve to achieve moisture equilibrium before taking relative humidity readings. The probe shall be at the same temperature as the concrete before the reading. Check for drift and follow meter manufacturer recommendations.
- E. Record the relative humidity to the nearest percent and temperature to the nearest degree. Record location of hole within the structure and depth of probe. Use the relative humidity probe to measure the ambient air temperature and relative humidity above the slab in the vicinity of the test location. Remove the liner and fill the hole with a cementitious patching compound.
- F. In the event the relative humidity exceeds 75% and the flooring manufacturer recommended limits, CONTRACTOR shall propose remediation to OWNER. In new concrete slab construction, remediation shall be at no cost to the OWNER.

**3.4 PH LEVEL TESTING**

- A. Perform testing in accordance with ASTM F710, and at the same time as the vapor emission and relative humidity tests.
- B. Place several drops of water onto the concrete surface to form a puddle approximately 1" in diameter. Allow the water to set for 60 +/- 5 seconds. Dip the pH paper into the water and remove immediately, compare color to chart provided by paper supplier to determine pH reading. Record and report results.
- C. When using pH Pencil and pH Meters, follow the instrument manufacturer's instructions.
- D. The surface of the concrete should have a pH of 9 or less. In the event the pH exceeds this value and the flooring manufacturer recommended pH limits, CONTRACTOR shall propose remediation to OWNER. In new concrete slab construction, remediation shall be at no cost to the OWNER.

**3.5 BOND TEST**

- A. Perform bond testing in accordance with ASTM D4541 or per manufacturer's recommendations.

**SECTION 09 0565**  
**MOISTURE TESTING FOR FLOORING INSTALLATION**

- B. Select appropriate locations for the bond tests such as near walls or in light traffic areas. Spaced test samples approximately 50 feet apart throughout the designated installation area. The number of tests will be as determined by the recommended spacing of 50 feet.
- C. Use the flooring material and recommended adhesives. Install 3' x 3' panels using the exact techniques that will be used for the flooring installation. It is recommended that tests be spaced approximately 50 feet apart throughout the designated installation area. Tape edges of panels to prevent edge drying of adhesive. Protect test panel from traffic.
- D. After 72 hours of placing the flooring, remove tape and observe whether it is bonded tightly to the floor, by trying to lift the edges with a scraper or other means, or pull flooring from the subfloor by hand. Determine if bonding is suitable for flooring installation.
- E. At locations where membrane, primer, leveler, or patch are applied, perform applicable bond testing recommended by flooring manufacturer to assure adequate bondage of flooring to substrate.
- F. Success or failure shall be determined by visual interpretation and the amount of physical effort required to remove the floor covering. If the flooring material can be removed, it will indicate failure of the bond test. If the flooring requires a great deal of effort to pull it up, the bond test can be considered successful, providing no sign of moisture is found. If bond failure occurs in new concrete slab construction, remediation shall be at no cost to OWNER.

3.6 CLEAN UP

- A. Remove rubbish, debris and waste materials and legally dispose of them off the Project site.

3.7 PROTECTION

- A. Protect the Work of this section until installation of finish flooring.

END OF SECTION

**SECTION 09 2900  
GYPSUM BOARD**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Walls and Ceilings.
  - 2. Cementitious backer board.
  - 3. Accessories.

**1.2 RELATED SECTIONS**

- A. Related Sections:
  - 1. Section 06 1000 – Rough Carpentry.
  - 2. Section 07 1000 – Damproofing.
  - 3. Section 07 9200 – Joint Sealants.
  - 4. Section 09 9123 – Interior Painting.

**1.3 REFERENCES**

- A. ASTM C1396 – 11 Standard Specifications for Gypsum Board.
- B. ASTM C473 – 12 Standard Test Methods for Physical Testing of Gypsum Panel Products.
- C. ASTM C1629 – Standard Classification for Abuse-Resistant Non-decorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.

**1.4 PERFORMANCE REQUIREMENTS**

- A. Level 3 (highest) for hard- and soft-body impact when tested in accordance with ASTM C1629.
- B. Average water absorption for panels is not greater than (5) percent byweight after a two-hour immersion when tested in accordance with ASTM C473.

**1.5 SUBMITTALS**

- A. Submit under provisions of Division 1 – Submittal Procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.

**SECTION 09 2900  
GYPSUM BOARD**

1.6 QUALITY ASSURANCE

- A. Quality Standards: GA-216 – Recommended Specifications for the Application and Finishing of Gypsum Board.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.

1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering items which may be incorporated in the Work include the following:
  1. U.S. Gypsum Co.
  2. National Gypsum Properties, LLC.
  3. American Gypsum.
  3. Or approved equal.

2.2 GYPSUM BOARD

- A. Mold and Water-Resistant Gypsum Board: 5/8" thick.
  1. Resistance to Mold Growth: Minimum score of "10" when tested in accordance to ASTM D3273 and evaluated in accordance with ASTM D3274.
- B. Impact Resistant Gypsum Board, Type X (fire-resistant): 5/8 inch thick with tapered edges, face paper folded around long edges to reinforce and protect core, ends cut square and finished smooth.
  1. Fire resistant rated gypsum core with additives to enhance impact resistance, faced with moisture and mold resistant paper and reinforcing fiber mesh. Comply with ASTM C1629 level 3 hard body impact resistance.
- C. Hi-impact XP Gypsum Board: 5/8 inch thick with tapered edges, moisture and mold resistant paper faced gypsum board with superior impact resistance.

**SECTION 09 2900  
GYPSUM BOARD**

2.3 ACCESSORIES

- A. Corner Beads and Edge Trim: GA 201 and GA 216.
- B. Joint Materials: Reinforcing tape and joint compound.
- C. Fasteners: Type S12 screws.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Division 1 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected and approved by Engineer.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the County.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions and as indicated on the Drawings.
- B. Fasten gypsum board to furring or framing with screws.
- C. Tape, fill, and sand joints.

3.3 FINISH LEVEL SCHEDULE

- A. Level 4: Walls and ceilings are scheduled to receive paint finish.
  - 1. Level 1, plus three (3) separate coats of compound at joints, angles, fasteners, and accessories. Compound shall be smooth and free of tool marks and ridges.

3.4 PROTECTION

- A. Protect installed products until Substantial Completion.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

**SECTION 09 2900  
GYPSUM BOARD**

Payment for items of work covered under Division 9 of the plans and these specifications shall be based on the lump sum bid pricing identified in the Bid Schedule. No additional compensation will be allowed.

END OF SECTION

**NOT FOR BID**

**SECTION 09 6516  
VINYL SHEET FLOORING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Vinyl sheet flooring as indicated.
- B. Related Requirements:
  - 1. Division 01 - General Requirements.

**1.2 DEFINITIONS**

- A. Pop-up: A pop-up is defined as any surface deviation or looseness of substrate that is equal to or greater than 1/64 (0.015625) inch above the concrete floor level, regardless of the size.

**1.3 SUBMITTALS**

- A. Product Data: Submit manufacturer's published technical data describing warmaterials, construction and recommended installation instructions. Submit technical data and installation instructions for each adhesive material. Submit list and Product Data of recommended finish materials.
- B. Maintenance Instructions: Submit manufacturer's recommendations for maintenance, care, and cleaning of vinyl sheet flooring.
- C. Samples: Submit Samples of vinyl sheet flooring and any reducers or transitions in each available color and pattern. Following color selections, submit full size samples of each selected color and pattern. Submit pint cans of each type of adhesive.
- D. Maintenance Materials: Before Substantial Completion, deliver one unopened container of each color and pattern of vinyl sheet flooring in each color and pattern installed. Label each container indicating locations installed. Include unopened cans of adhesives adequate to install the maintenance materials.
- E. Installer's Experience Qualifications: Submit list of not less than five projects, extending over period of not less than five years, indicating installer's experience record. Submit letter from manufacturer indicating manufacturer's approval for installer of the products.

**1.4 QUALITY ASSURANCE**

- A. Qualifications of Installer: Minimum five years' experience in successfully installing the same or similar flooring materials.
- B. Qualifications of Supervising Installer: In addition to the qualifications of the installer listed above, the flooring installer's supervisor shall have a minimum of 10 hours Cal-OSHA safety training.

**SECTION 09 6516  
VINYL SHEET FLOORING**

- C. Pre-Installation and Progress meetings: Prior to start of work of this section and after approval of submittals, schedule on-site meetings between Contractor, Supervising Installer, OAR and Project Inspector to review installation and procedures required for project.
- D. Comply with the following as a minimum requirement:
  - 1. Materials shall be compliant with requirements of CBC Chapter 11B and ADAAG.
  - 2. ASTM E84: Class A Flame Spread Rating of 25 or less.
  - 3. Comply with current CHPS requirements, [www.chps.net](http://www.chps.net).
  - 4. Moisture Testing: ASTM F1869.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Materials shall be delivered to the Project site in original unopened manufacturer's packaging clearly labeled with manufacturer's name.
- B. Materials shall be stored at room temperature, but not less than 70 degrees F for not less than 48 hours before installation, unless manufacturer's instructions specify otherwise.

1.6 PROJECT CONDITIONS

- A. Ventilation and Temperature: Verify areas that are to receive new flooring are ventilated to remove fumes from installation materials. Verify that areas are within temperature range recommended by the various material manufactures for Project site installation conditions.

1.7 WARRANTY

- A. Manufacturer shall provide a five-year material warranty.
- B. Installer shall provide a two-year fabrication and installation warranty.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Shaw Contract
- B. Armstrong Contract Interiors.
- C. Mannington Commercial.
- D. Or equal.

2.2 MATERIALS

- A. Vinyl Sheet flooring: Conform to ASTM F1066, Composition 1, asbestos free, Class 2 (through pattern), 6 ft x 60 ft minimum, 0.075-inch-thick (2mm), colors and patterns as indicated on Drawings.

**SECTION 09 6516  
VINYL SHEET FLOORING**

1. Sheet flooring shall be from same batch and run number for each color.
- B. Crack Filler and Leveling Compound: 100 percent cementitious binder type (as defined by ASTM C150), shall be approved by Owner's Office of Environmental Health and Safety (OEHS). The following manufacturers are currently listed approved by OEHS:
  1. Ardex SD-F.
  2. Schonox SL.
  3. Armstrong S183 or S184.
  4. Equal, as recommended by flooring manufacturer and approved by OEHS.
  5. Leveling Compound shall meet or exceed 200 pounds when tested in accordance with ASTM C 1583.
- C. Concrete Primer: Non-staining type recommended by manufacturer of vinyl sheet flooring. Concrete primer shall be OEHS approved.
- D. Adhesive: Water based, low odor type formulated specially for installation with vinyl sheet flooring, and recommended by manufacturer.
- E. Reducer Strips: Tapered rubber not less than one inch wide, and thickness to match sheet. Install with double sided tape.
  1. Burke Flooring.
  2. 3M Company.
  3. Guerilla Glue Company.
  4. Equal.
- F. Floor Finish: One of the following systems:
  1. Neutral cleaner, Robusto, seal Hil-Tex and finish Explorer, manufactured by Hillyard.
  2. Neutral cleaner, ACT sealer and Super Polymer 85 finish, manufactured by Maintex.
  3. Sundance cleaner and Butcher's Mainstay floor finish, manufactured by Waxie Stationary Supply.
  4. Equal.

**PART 3 - EXECUTION**

**3.1 COORDINATION**

- A. Coordinate with related Work to assure level, dry, smooth, and clean finish surfaces to receive vinyl sheet.

**3.2 EXAMINATION**

- A. Field verify and correct deficiencies of conditions affecting Work before commencing Work of this section.

**3.3 INSTALLATION OF SHEET FLOORING**

- A. Color and pattern: Install sheets in the same direction.

**SECTION 09 6516**  
**VINYL SHEET FLOORING**

- B. Install vinyl sheet flooring when ambient temperature is 70 degrees F or higher or manufacturer's range. Each sheet shall be trimmed to fit and that factory edge be properly removed before adhering. Seams should always be under scribed after the material has been placed into the adhesive and rolled. Measure the area to be installed and determine the direction in which the material will be installed and seam placement. Seams should be a minimum of 6" away from underlayment and concrete joints, saw cuts, etc. Cut the required length for the first sheet off of the roll, adding approximately 3" - 6" for extra trimming. • Fit the first sheet along the main (long) wall and at the ends using standard fitting methods.
- C. Install the sheet adhesive in a thin film evenly with a notched trowel. Trowel notches shall be as recommended by adhesive manufacturer.
  - 1. Mix adhesive in accordance with manufacturer's instructions.
  - 2. Install adhesive only in area that can be covered by flooring material within the adhesive manufacture's recommended working time. Do not set sheet into wet adhesive.
  - 3. Sheets must be set into dry, but still tacky, adhesive film. Remove adhesive that has dried beyond recommended time, or has filmed over and is no longer tacky.
  - 4. Adhesive application rate shall be as required to avoid telegraphing trowel lines to the surface after maintenance coatings are applied. Adjust sheet runoff during installation if necessary.
  - 5. Immediately remove any excess adhesive from the sheet surface using the adhesive manufacturer's recommended cleaner and a damp, not wet, cloth.
- D. Provide reducer where floor covering edges are exposed, such as at center of the door or where floor coverings terminate.
- E. Install sheets symmetrically about centerlines of areas progressing toward walls. Sheets shall be straight and joints close. Sheets shall be cut to fit snugly at doorframes, and walls. No slivers at edges.
- F. Mechanically cut flooring material to produce square true edges.
- G. As floor sheets is installed and within adhesive's recommended working time, roll with a clean, smooth, 100-pound roller in both directions. As the rolling proceeds, replace any loosened, defective, or damaged sheet with new and finish to the specified condition.
- H. Remove dust, debris, and soil with any combination of sweeping, micro-fiber dust-mopping with a properly treated, non-oily mop and vacuuming.

3.4 CLEANING, WAXING, AND COMPLETION

- A. Maintain flooring surfaces clean as installation progresses.
- B. Use a sprayer to mist the area to be cleaned with a neutral cleaning solution prepared in accordance with manufacturer's instructions.

**SECTION 09 6516**  
**VINYL SHEET FLOORING**

- C. Gently scrub the floor using red or maroon cleaning, not stripping pads, mounted on a single disc, 175 RPM floor machine; or preferably, with a machine that uses horizontally mounted brushes with a counter-rotating spindle motion. Never allow the machine to remain running stationary.
- D. Remove the resulting slurry with a wet vacuum.
- E. Rinse the floor at least four times, each time using a clean mop and clean rinse water. On the first rinse, apply just enough water to keep the floor wet until the solution is picked-up with a vacuum. The next two rinses should be with a fairly well wrung-out, damp mop. The final rinse should produce virtually clean rinse water. Ensure the rinse water is clean throughout the rinsing process. Avoid tracking the floor after the final rinse. Check the floor after the final rinse for any missed areas and re-scrub/rinse as needed. Repeat the rinsing process until all signs of the cleaning solution are removed and the floor shows no sign of haziness or dusting when dry. If the Contractor has lightweight "automatic" floor machines capable of achieving the same result as described above, they may be used in-place of this method. Do not flood or excessively dampen floor at any time.
- F. Allow the Work to dry thoroughly.
- G. Finish vinyl sheet flooring with two coats of sealer, and four coats of finish (wax) applied in accordance with manufacturer's instruction. Each coat shall dry for a period of time recommended by the manufacturer. The last coat of floor wax shall be burnished in accordance with manufacturer's written instructions. Take care not to allow any foreign material, including dust and mop fibers to become embedded in any coat of wet sealer or finish.
- H. After the last coat of floor finish has dried sufficiently according to the manufacturer's instructions, burnish work, using high speed equipment, in accordance with manufacturer's written instructions to bring the entire surface, including the corners and edges, to high level of luster, free of marks and dust embedded in finish
- I. Clean adjacent baseboard and other surfaces of adhesive and other materials. Replace damaged or defective Work to the specified condition.

3.5 CLEAN UP

- A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

3.6 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

**SECTION 09 9123  
INTERIOR PAINTING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section includes surface preparation and the application of paint systems on the following interior substrates listed in 3.6 Interior Painting Schedule.
- B. Related Requirements:
  - 1. Section 06 2000 "Finish Carpentry" for surface preparation and the application of paint systems on substrates.
  - 2. Section 09 2900 Gypsum Board.

**1.3 DEFINITIONS**

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 1 to 2 units at 85 degrees.
- B. Gloss Level 2: 5 to 9 units at 60 degrees and 10 to 15 units at 85 degrees.
- C. Gloss Level 3: 10 to 15 units at 60 degrees and 15 to 30 units at 85 degrees.
- D. Gloss Level 4: 20 to 35 units at 60 degrees and 35 to 50 units at 85 degrees.
- E. Gloss Level 5: 40 to 50 units at 60 degrees.
- F. Blocking: Two painted surfaces sticking together such as a painted door sticking to a painted jamb.
- G. Mildew Resistant: Certified products are specially formulated with microbicidal additives that resist mold, mildew, and algae growth on the paint film and inhibit growth of bacterial odors.
- H. CHPS: Collaborative for High Performance Schools. A national movement to improve student performance and the entire educational experience by building the best possible schools. [www.chps.net](http://www.chps.net).
- I. EG: Ethylene Glycol. Ethylene glycol is listed as a hazardous air pollutant (HAP) by the U.S. EPA.

**SECTION 09 9123  
INTERIOR PAINTING**

- J. PDCA: Painting & Decorating Contractors of America [www.pdca.org](http://www.pdca.org) .
- K. RAVOC: Reactivity adjusted VOC. "Reactivity" means the ability of a VOC to promote ozone formation
- L. SSPC: The Society for Protective Coatings publishes Scopes of SSPC Surface Preparation Standards and Specifications [www.sspc.org](http://www.sspc.org) .
- M. Dunn-Edwards Conformance Chart: [D-E CONFORMANCE TABLE](#)

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. LEED v.4 Requirements: Interior paints and coatings must pass CDPH Standard Method V1.1 (also called section 01350) emissions testing; and they must comply with the VOC content limits of the California ARB 2007 Suggested Control Measure for Architectural Coatings.
- C. Samples for Initial Selection: For each type of topcoat product.
- D. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
  - 1. Submit Samples on rigid backing, no smaller than 7 inches X 10 inches (177 mm X 254 mm) or larger than 8.5 inches X 11 inches (216 mm X 280mm).
  - 2. Label each Sample for project, architect, general contractor, painting contractor, paint color name and number, paint brand name, "P" number if applicable, and application area.
- E. Product List: For each product indicated, include the following:
  - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
  - 2. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Paint: Provide not less than 1 gal. (3.8L) of each material and color applied.

1.6 QUALITY ASSURANCE

**SECTION 09 9123  
INTERIOR PAINTING**

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
    - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
    - b. Other Items: Architect will designate items or areas required.
  2. Final approval of color selections will be based on mockups.
    - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
  3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

**1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
1. Maintain containers in clean condition, free of foreign materials and residue.
  2. Remove rags and waste from storage areas daily.

**1.8 FIELD CONDITIONS**

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50- and 90-degrees F (10 and 32 degrees C).
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F (3 degrees C) above the dew point; or to damp or wet surfaces.
- C. A painting contractor should follow proper painting practices and exercise judgment based on his or her experience and project specific conditions as to when to proceed.

**SECTION 09 9123  
INTERIOR PAINTING**

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Basis-of-Design Product: Provide products listed from the Dunn-Edwards Corporation.
- B. OR Equal.

**2.2 PAINT, GENERAL**

- A. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another, and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. VOC Content: Provide material that complies with VOC limits of authorities having jurisdiction.
- C. Colorants: The use of colorants containing hazardous chemicals, such as ethylene glycol, is prohibited and zero VOC colorants should be used whenever possible.
- D. Colors: As selected by the Architect.
  - 1. Indicate a percentage of surface area which will be painted with deep tones.

**2.3 SOURCE QUALITY CONTROL**

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
  - 1. The owner may engage the services of a qualified testing agency to sample paint materials. The contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project the Project samples may be taken at Project site. Samples will be identified, sealed, and certified by a testing agency.
  - 2. The testing agency will perform tests for compliance with product requirements.

**SECTION 09 9123  
INTERIOR PAINTING**

3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractors will comply with requirements to use compatible products and systems as described in Article 2.2. The contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  1. Wood: 15 percent.
  2. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that the finishing compound is sanded smoothly.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
  1. Application of coating indicates acceptance of surfaces and conditions.

**3.2 PREPARATION**

- A. Comply with manufacturer's written instructions.
- B. Remove hardware, covers, plates, and comparable items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

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1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair the bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  1. Remove incompatible primers and re-prime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Aluminum Substrates: Remove loose surface oxidation.
- E. Wood Substrates:
  1. Scrape and clean knots and apply coat of knot sealer before applying primer.
  2. Sand surfaces that will be exposed to view and dust off.
  3. Prime edges, ends, faces, undersides, and backsides of wood.
  4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

**3.3 APPLICATION**

- A. Apply paints according to manufacturer's written instructions.
  1. Use applicators and techniques suited for paint and substrate indicated.
  2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  3. Paint the front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
  4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat to a lighter shade of the finish coat (not to exceed 2 ounces of colorant) to facilitate identification of each coat if multiple coats of same material are to be applied.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

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INTERIOR PAINTING**

E. Block Fillers: Provide block fill as scheduled to conform to the following PDCA Standard P12-05:

1. Level 3 - Premium Fill: One or multiple coats of high-performance block filler manufactured to be applied to a high dry film build. The block filler shall be back rolled to eliminate voids and to reduce most of the masonry profile depth.

**3.4 FIELD QUALITY CONTROL**

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. The contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

**3.5 CLEANING AND PROTECTION**

- A. At the end of each workday, remove rubbish, empty cans, rags, and other discarded materials from the Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

**3.6 INTERIOR PAINTING SCHEDULE**

A. Gypsum Board Substrates:

1. Premium Low Odor / Zero VOC Latex System:

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INTERIOR PAINTING**

- a. Prime Coat: Primer sealer, latex, interior, Dunn-Edwards, Vinylastic Select [VNSL00](#).
  - b. Intermediate Coat: Latex, interior, matching topcoat
  - c. Topcoat: Latex, interior, semi-gloss, Dunn-Edwards, Spartawall [SWLL50](#), (Gloss Level 5).
- B. Concrete Substrates, Masonry, Clay, Nontraffic Surfaces:
1. Premium Low Odor / Zero VOC Latex System:
    - a. Prime Coat: Primer, alkali resistant, waterbased, interior/exterior, Dunn-Edwards, Eff-Stop Select [ESSL00](#).
    - b. Intermediate Coat: Latex, interior, matching topcoat.
    - c. Topcoat: Latex, interior, semi-gloss, Dunn-Edwards, Spartawall [SWLL50](#), (Gloss Level 5).
- C. CMU Substrates:
1. Premium Low Odor / Zero VOC Latex System:
    - a. Block Filler: Block filler, latex, interior/exterior, Dunn-Edwards, Smooth Blocfil Select [SBSL00](#).
    - b. Intermediate Coat: Latex, interior, matching topcoat.
    - c. Topcoat: Latex, interior, semi-gloss, Dunn-Edwards, Spartawall [SWLL50](#), (Gloss Level 5).
- D. Ferrous Metal Substrates:
1. Premium Low Odor / Zero VOC Latex over a Waterborne Alkyd Primer System:
    - a. Prime Coat: Primer, alkyd, anti-corrosive, for metal, Dunn-Edwards, Bloc-Rust Premium [BRPR00](#) Series or Enduraprime rust preventative primer [ENPR00](#).
    - b. Intermediate Coat: Latex, interior, matching topcoat.
    - c. Topcoat: Latex, interior, semi-gloss, Dunn-Edwards, Spartawall [SWLL50](#), (Gloss Level 5).
- E. Non-Ferrous Metal Substrates:
1. Premium Low Odor / Zero VOC Latex System:

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- a. Pre-Treatment: Waterbased, Krud Kutter, Metal Clean & Etch [SCME-01](#)
- b. Prime Coat: Primer, waterbased, Dunn-Edwards, Ultrashield Galvanized Metal Primer [ULGM00](#).
- c. Intermediate Coat: Latex, interior, matching topcoat.
- d. Topcoat: Latex, interior, semi-gloss, Dunn-Edwards, Spartawall\_ [SWLL50](#), (Gloss Level 5).

F. Wood Substrates:

1. Premium Low Odor / Zero VOC Latex System:
  - a. Prime Coat: Primer, acrylic, for interior wood, Dunn-Edwards, Ultra-Grip Select [UGSL00](#) or Dunn-Edwards, Inter-Kote [IKPR00](#).
  - b. Intermediate Coat: Latex, interior, matching topcoat.
  - c. Topcoat: Latex, interior, semi-gloss, Dunn-Edwards, Spartawall\_ [SWLL50](#), (Gloss Level 5).

END OF SECTION

**SECTION 10 1414  
SIGNAGE**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes: Supply and installation of Interior Room Signs, and Geometric Signs.
- B. Related Sections:
  - 1. Project Signs, see Construction Facilities and Temporary Controls: Section 01 5000.
  - 2. Division 09: Finishes

**1.2 SUBMITTALS**

- A. Make submittals in accordance with Division 1.
- B. Shop Drawings: Submit shop drawings showing sizes of signs and lettering, construction details of signs and anchoring details.
- C. Submittals: Submit color and texture samples of all materials to be used for signs.
- D. Samples: Submit 1 full size sample of each toilet room sign.

**1.3 QUALITY ASSURANCE**

- A. Manufacturers shall have been regularly engaged in manufacturing identifying devices for a minimum of 5 years.
- B. Pre-Installation Conference: Notify County when signs are ready for installation. Arrange for conference at site. Do not proceed with installation until ARCHITECT'S approval of specific locations and methods of attachment has been obtained.
- C. Provide signs from one manufacturer.

**1.4 PRODUCT HANDLING**

- A. Use all means necessary to protect signs before, during and after installation. In the event of damage, immediately make necessary repairs and replacements.

**SECTION 10 1414  
SIGNAGE**

**PART 2 - PRODUCTS**

**2.1 MANUFACTURE**

- A. Products of the following manufacturers are acceptable and are the basis for intended design and quality.
1. Vomar Products Inc.
  2. ASI-Modulex, Inc.
  3. Mohawk Sign Systems, Inc.
  4. Accent Signage Systems.
  5. The Gruenke Company.
  6. Ada Sign Products.
  7. AccuBraille.
  8. Equal.

**2.2 MATERIAL AND FABRICATION**

- A. Interior Room Identification Sign Materials:
1. Substrate Panel: 1/8 inch minimum thick, integrally colored, or clear acrylic plastic, or laminated acrylic. Conforming to ASTM D4802; non-glare (matte), UV stable, suitable for interior and exterior use.
    - a. Corners shall be square.
    - b. Edges shall be square and eased.
    - c. Colors as selected by ARCHITECT from manufacturer's custom color range.
  2. Fasteners:
    - a. Stainless steel tamper-proof screws and plastic anchors.
    - b. Signs mounted on fire-rated doors shall be secured with adhesive.
    - c. Adhesives and sealants shall comply with the limits for VOC content.
- B. Characters and Symbols: Shall be fabricated by one of the processes described below:
1. Computer cut raised characters and graphics shall be cut from 1/16 inch integrally colored acrylic. Raised characters and graphics shall be inlaid 1/32 inch minimum into first surface of sign background, secured with adhesive so it cannot be removed without the use of tools. Raised characters and graphics shall have beveled, eased, or rounded edges.

## **SECTION 10 14 14 SIGNAGE**

Non-tactile text and graphics shall be applied to the second surface, and background color shall be applied to the second surface and protected with film or an additional backplate. Pictograms and other symbols including the International Symbol of Accessibility, which are included on signs with raised characters and Braille, are not required to be raised.

2. Raised characters and graphics including braille shall be integral to sign face and shall be formed into sign face by high pressure thermoforming using a negative mold. No applied, glued, welded tactile elements are acceptable. Raised characters and graphics shall have beveled, eased, or rounded edges. No sharp, square edges are acceptable. Non-tactile text and graphics shall be applied to the second surface, and background color shall be applied to the second surface and protected with vinyl film. Pictograms and other symbols including the International Symbol of Accessibility, which are included on signs with raised characters and Braille, or other signs are not required to be raised.

### **2.3 COMMUNICATION ELEMENTS AND FEATURES**

- A. Raised Characters shall comply with CBC 11B-703.2 and shall be duplicated in Braille complying with Section 11B-703.3.
  1. Character Type: Characters on signs shall be raised 1/32 inch minimum above their background and shall be sans serif uppercase characters duplicated in Braille. Characters and Braille shall be in a horizontal format.
  2. Character Height: Character height measured vertically from the baseline of the character shall be 5/8 inch minimum and 2-inch maximum based on the height of the uppercase letter "I".
  3. Character Proportions: Characters shall be selected from fonts where the width of the uppercase letter "O" is 60 percent minimum and 110 percent maximum of the height of the letter "I".
  4. Stroke Thickness: Stroke thickness of the uppercase letter "I" shall be 15 percent maximum of the height of the character.
  5. Character and Line Spacing shall be in conformance to CBC 11B-703.2.7 and 11B-703.2.8.
  6. Character Placement: Shall be placed in accordance with Section 2.3, F (2) below.
- B. Braille: Contracted Grade 2 Braille, conforming to CBC 11B-703.3. Braille characters shall be inlaid optically correct acrylic Raster beads into computer drilled holes in the panel surface.

**SECTION 10 14 14**  
**SIGNAGE**

1. Dimensions and Capitalization: Braille dots shall have a domed or rounded shape and shall comply with CBC Table 11B-703.3.1. The indication of an uppercase letter or letters shall only be used before the first word of sentences, proper nouns and names, individual letters of the alphabet, initials, and acronyms.
  2. Position: Braille shall be positioned below the corresponding text in a horizontal format, flush left or centered. If text is multi-lined, Braille shall be placed below the entire line of text. Braille shall be separated 3/8 inch minimum and 1/2 maximum from any other tactile characters and 3/8 inch minimum from raised borders and decorative elements.
- C. Visual Characters: If accompanied by Braille, then comply with 11B-703.2. Otherwise, Visual characters shall comply with CBC Section 11B-703.5. Characters shall be conventional in form and shall be uppercase or lowercase or a combination of both, as indicated on the drawings. Characters shall not be italic, oblique, highly decorative, or of other unusual forms.
1. Finish and Contrast: Characters and their backgrounds shall have a non-glare finish. Characters shall contrast with their background with either light characters on a dark background or a dark character on a light background.
  2. Character Proportions: Characters shall be selected from fonts where the width of the uppercase letter "O" is 60 percent minimum and 110 percent maximum of the height of the uppercase of the letter "I".
  3. Character Height: Minimum character height shall comply with CBC Table 11B-703.5.5.
  4. Height from Finish Floor or Ground: Visual characters shall be 40 inches minimum above the finish floor or ground.
  5. Stroke Thickness: Uppercase letter "I" shall be 10 percent minimum and 20 percent maximum of the height of the character.
  6. Character and Line Spacing: Shall be in accordance with CBC 11B-703.5.8 and 11B-703.5.9.
- D. Pictograms: In conformance to CBC 11B-703.6. Pictograms shall have a field height of 6 inches minimum. Characters and Braille shall not be in the pictogram field.
1. Pictogram field: Pictogram shall provide a field height of 6-inches minimum. Characters and Braille shall not be in the pictogram field.
  2. Finish and Contrast: Pictograms and their field shall have a non-glare finish. Pictograms shall contrast with their field with either a light pictogram on a dark field or a dark pictogram on a light field.

**SECTION 10 14 14**  
**SIGNAGE**

3. Text Descriptors: Pictograms shall have text descriptors located directly below the pictogram field, and shall comply with CBC 11B- 703.2, 11B-703.3 and 11B-703.4.
- E. International Symbol of Accessibility (ISA): Shall comply with CBC 11B-703.7 and CBC Figure 11B-703.7.2.1. The ISA shall consist of a white figure on a blue background. The blue color shall be approximate to FS. 15090 in Federal Standard 595C.
- F. Mounting Locations and Height: Signs with tactile characters shall be as indicated on the drawings and in conformance with CBC 11B-703.4.
  1. Mounting Locations:
    - a. Identification signs for rooms and spaces shall be located on the wall adjacent to the latch side of the door, as one enters the room or space.
    - b. Signs that identify exits shall be located at the exit door when approached in the direction of egress travel.
    - c. Signs containing tactile characters shall be located so that a clear floor space 18-inches minimum by 18-inches minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45-degree open position.
    - d. Where a tactile sign is provided at a door, the sign shall be located alongside the door at the latch side.
    - e. Where a tactile sign is provided at double doors with one active leaf, the sign shall be located at the inactive leaf.
    - f. Where a tactile sign is provided at double doors with two active leaves, the sign shall be located to the right of the right-hand door.
    - g. Where there is no wall space at the latch side of a single door or at the right side of double doors, signs shall be located on the nearest adjacent wall.
  2. Mounting height above finish floor or ground: Tactile characters on signs shall be located 48 inches minimum above the finish floor or ground surface, measured from the baseline of the lowest Braille cells and 60 inches maximum above the finish floor or ground surface, measured from the baseline of the highest line of raised characters.

**2.4 RESTROOM SIGNAGE**

- A. Restrooms shall be provided with geometric and wall mounted pictograms with text descriptors accompanied by Braille.

**SECTION 10 14 14**  
**SIGNAGE**

- B. Room Identification for Restrooms: Provide a 6-inch-wide by 9-inch-tall room identification sign, including a pictogram of the International Symbol of Accessibility on the side. Restroom names shall be "ALL GENDER." Characters, Braille, pictograms and mounting locations and height shall be in conformance to section 2.3.
- C. Geometric Symbols:
  - 1. Doorways leading to toilet rooms shall be identified by a geometric symbol complying with CBC Section 11B-703.7.2.6.
  - 2. "All Gender" Restroom Door Sign (Single occupancy restrooms): 1/4-inch-thick circle, 12-inch diameter with a 1/4-inch-thick equilateral triangle with the vertex pointing upward superimposed on the circle and within the 12-inch diameter. Triangle and circle shall be of contrasting colors; the circle symbol shall contrast with the door. A female and male silhouette shall appear within the equilateral triangle in contrasting color to it, and the word "restroom" shall appear on the bottom part of the circle in contrasting color to it.
  - 3. Edges and Vertices on Geometric Symbols: Shall be eased or rounded at 1/16 inch minimum or chamfered at 1/8 inch maximum. Vertices shall be radiused between 1/8 minimum and 1/4 inch maximum.
  - 4. Location and Mounting Height: Symbols shall be mounted at 58 inches minimum and 60 inches maximum above the finish floor or ground surface measured from the centerline of the symbol. Where a door is provided the symbol shall be mounted within one inch of the vertical centerline of the door.

**PART 3 – EXECUTION**

**3.1 EXAMINATION**

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means the installer accepts the condition of existing surfaces.

**3.2 INSTALLATION**

- A. Interior Identification Signs:
  - 1. Anchor signs to wall using 4 tamperproof, round head screws, one at each corner of sign. Furnish plastic anchors.

**SECTION 10 14 14  
SIGNAGE**

- 2. In addition to screws, signs shall be secured to wall with high-bond two-faced tape.
  - B. Geometric Signs: Toilet room signs shall be anchored to doors with 3 tamperproof countersunk screws, designed for anchoring to material of wall.
- 3.3 CLEANUP
- A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.
- 3.4 PROTECTION
- A. Protect Work of this section until Substantial Completion.

Payment for items of work covered under Division 10 of the plans and these specifications shall be based on the lump sum bid pricing identified in the Bid Schedule. No additional compensation will be allowed.

END OF SECTION

**SECTION 10 2600  
CORNER GUARDS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

Section Includes: Corner guards.

- A. Related Documents: The Contract Documents, as defined in Section 01110 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- B. Related Sections:
  - 1. Section 06 1000 - Rough Carpentry.
  - 2. Section 09 2900 - Gypsum Board.
  - 3. Section 09 9123 – Interior Painting.

**1.2 SUBMITTALS**

- A. Section 01 3300 - Submittal Procedures: Procedures for submittals.
  - 1. Shop Drawings:
    - a. Submit shop drawings indicating dimensions, locations, types, sizes, and finishes for Architect's approval.
  - 2. Samples: Submit two 12-inch sections of corner guards illustrating component design, configuration, color, and finish.

**1.3 SEQUENCING**

- A. Coordinate installation with wall construction, including concealed blocking or anchoring devices, installation of wall base, and painting.

**1.4 WARRANTY**

- A. Section 01 7800 - Closeout Submittals: Procedures for closeout submittals.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

**SECTION 10 2600  
CORNER GUARDS**

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
  - 1. Construction Specialties, Inc. (C/S), Muncy, PA (800) 233-8493.
  - 2. Pawling Corporation, Wassaic, NY (800) 431-3456.
  - 3. InPro Corporation, Muskego, WI, (800) 222-5556.
- B. Section 01 6000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

**2.2 CORNER GUARDS**

- A. Subject to compliance with requirements, provide corner guards with the following characteristics:
  - 1. Stainless steel, 2-inch wings, 90 degrees
  - 2. Clear polycarbonate, 2-inch wings, 90 degrees
- B. Corner Guards: 4'-0" long surface mounted and anchored to wall at 20 inches on center maximum.

**2.3 ACCESSORIES**

- A. Provide attachment accessories as recommended by corner guard manufacturer.

**2.4 FABRICATION**

- A. Fabricate components with tight joints, corners, and seams.
- B. Pre-drill holes for attachment.
- C. Form ends trim closure by capping and finishing smooth.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Section 01700 - Execution Requirements: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates, and conditions are as required, and ready to receive Work.

**SECTION 10 2600  
CORNER GUARDS**

- C. Report in writing to Project Manager prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

**3.2 INSTALLATION**

- A. Install in accordance with manufacturer's published instructions, square and plumb, secured rigidly in position.
- B. Install corner guards with tops at 5'-0" above finished floor.

END OF SECTION

NOT FOR BID

**SECTION 10 2813  
TOILET ACCESSORIES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Toilet accessories.
- B. Related Requirements:
  - 1. Division 01 - General Requirements.
  - 2. Section 06 1000- Rough Carpentry.

**1.2 REGULATORY REQUIREMENTS**

- A. Comply with CBC Chapter 11B requirements and ADAAG recommendations for accessibility.

**1.3 SUBMITTALS**

- A. Shop Drawings: Submit a schedule of accessories and Shop Drawings indicating installation methods and fasteners.

**1.4 QUALITY ASSURANCE**

- A. Coordinate related Work as required to ensure proper and adequate provision in framing of backing and wall finish for installation of accessories.

**1.5 DELIVERY, STORAGE AND HANDLING**

- A. Protect accessories from damage.

**PART 2 - PRODUCTS**

**2.1 GENERAL**

- A. Accessories shall be provided with necessary anchoring devices and fasteners appropriate for surfaces on which items are to be fastened.

**2.2 MATERIALS**

- A. Liquid Soap Dispenser: Surface mounted, Type 304, 22 gage stainless steel, satin finish, 40-ounce. capaCounty, operable with one hand push valve. Bobrick B-2111 OR equal.
- B. Multi-roll Toilet Paper Dispenser: Surface mounted, Type 304 stainless steel, satin finish. Front of door is drawn, one-piece, seamless construction. Secured to cabinet with two rivets. Equipped with a tumbler lock keyed like other Bobrick washroom accessories. Bobrick B-2888 OR equal.
- C. Paper Towel Dispenser: Surface mounted, Type 304 stainless steel, satin finish. Door with tumbler lock and piano hinge, Bobrick B-262, or equal.
- D. Grab Bar: Grab bar shall be type-304 stainless steel with satin-finish. Grab bar shall have 18-gauge wall thickness and 1-1/2" outside diameter. Clearance between the grab bar and wall shall be 1-1/2". Concealed mounting flanges shall be 11-gauge thick stainless-steel plate, 2" x 3-1/8", and equipped with at least two screw holes for attachment to wall. Flange

**SECTION 10 2813  
TOILET ACCESSORIES**

covers shall be 22 gauge, 3-1/4" diameter x 1/2" deep, and shall snap over mounting flange to conceal mounting screws and/or fasteners. Ends of grab bar shall pass through concealed mounting flanges and be arc welded to form one structural unit. Grab bar shall comply with accessible design (including ADAAG for structural strength. Exposed stainless steel to be 180 grit satin finish. B-6806 Bobrick, B-5897 Bobrick, OR equal.

- E. Mirrors: Frameless mirror. The glass shall be No. 1 quality, 1/4-inch float glass, electrolytically copper-plated. The back of mirror shall be protected by 1/8 inch thick, waterproof, shock-absorbing polyethylene padding. Mirror shall be securely attached to new casework. Size as indicated on Drawings to custom fit to new casework.
- F. Shower Seat: Folding shower seat with frames and supports constructed entirely of stainless-steel tubing. Slats shall be phenolic. Mounting hardware shall consist of stainless-steel screws with plastic plugs. Bobrick 5191 OR equal.
- G. Shower Curtain Rod: Surface-mounted, Type 304 stainless steel, satin finish. ASI 1214, Bobrick B-6107, Bradley, or equal.
- H. Shower Curtain: White opaque vinyl. ASI 1200-V 72, Bobrick 204-3, Bradley, or equal.
- I. Shower Curtain Hooks: Type 304 stainless steel. ASI 1200-SHU, Bobrick 204-1, Bradley, or equal.
- J. Access Panel: Stainless Steel recess wall mounted for tiling. Invisa OR equal.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Check openings in substrates to receive accessories. Verify openings are correctly located and sized to receive accessories, and that locations will comply with disability access requirements. Confirm that blocking, backing or support is properly located and adequate for the accessory installation.
- B. Verify spacing of plumbing fixtures and toilet partitions. Confirm spacing and locations are compatible with proposed accessory locations and will allow compliance with disability access requirements.

**3.2 INSTALLATION**

- A. Install toilet accessories in accordance with manufacturer's written recommendations and accessibility requirements. Fasten components firmly in place.
- B. Drill holes to correct size and application that is concealed by item with 1/4 inch tolerance.
- C. Install recessed accessories into wall openings with sheet metal screws into metal frames.
- D. Install surface-mounted accessories to backing plates with machine screws, plumb, and aligned.

**SECTION 10 2813  
TOILET ACCESSORIES**

- E. Grab Bars:
    - 1. At wood stud walls, fasten wood blocking with threaded stainless steel wood screws of sufficient length to penetrate blocking 1 ¼-inch minimum.
    - 2. At plaster or gypsum board walls, provide spacers of same thickness as wall material to prevent crushing of wall material.
  - F. Mirrors: Install mirror on manufacturer supplied concealed wall hanger and fasten with two theft-resistant locking screws.
  - G. Before Substantial Completion, deliver keys and maintenance instructions and product data to County/Engineer.
- 3.3 ADJUSTING AND CLEANUP
- A. Adjust accessories for proper operation.
  - B. Remove rubbish, debris, and waste material and legally dispose of off the Project site.
- 3.4 PROTECTION
- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

**SECTION 12 3616  
METAL COUNTERTOPS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

A. Drawings and general provisions of the Contract, including general and supplementary conditions and Divisions 01 Specifications Sections, apply to this Section.

**1.2 SUMMARY**

A. Section includes stainless-steel countertops.

**1.3 ACTION SUBMITTALS**

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, sections, details, and attachments to other work. Detail fabrication and installation, including field joints. Contractor to seek approval of shop drawing prior to ordering of metal counter.

**1.4 DELIVERY, STORAGE, AND HANDLING**

A. Deliver metal countertops only after casework has been completed in installation areas.

B. Keep finish surfaces covered with polyethylene film or other protective covering during handling and installation.

**1.5 FIELD CONDITIONS**

A. Field Measurements: Verify actual dimensions of construction to receive metal countertops by field measurements before fabrication.

**PART 2 – PRODUCTS**

**2.1 MATERIALS**

A. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.

B. Sealant for Countertops: Manufacturer's standard sealant of characteristics indicated below that complies with applicable requirements in Section 079200 "Joint Sealants."

1. Mildew-Resistant Joint Sealant: Mildew resistant, single component, non-sag, neutral curing, silicone.

2. Joint Sealant: Latex.

3. Color: Clear.

**SECTION 12 3616  
METAL COUNTERTOPS**

**2.2 STAINLESS-STEEL COUNTERTOPS**

- A. Countertops: Fabricate from 0.062-inch- thick, stainless-steel sheet. Provide smooth, clean exposed tops and edges in uniform plane, free of defects. Provide front and end overhang of 1-1/2 inch over the base cabinets.
1. Joints: Fabricate countertops without field-made joints
  2. Weld shop-made joints.
  3. Sound deadens the undersurface with heavy-built mastic coating.
  4. Extend the top down to provide a 1-1/2-inch- thick square edge height with a 1/2 -inch return.
  5. Extend backsplash bottom to upper cabinets.
  6. Provide standard edge profile around perimeter of countertops containing sinks; pitch tops containing sinks two ways to provide drainage without channeling or grooving.
  7. Provide wood blocking at backsplash and front square edge with return.
  8. Provide integrated stainless-steel sinks and splash to stainless steel countertop. All joints to be welded, seamless, & flush.
  9. Provide the ADA sink 6" deep to comply with required accessibility knee space clearance. See details for further information.

**2.3 STAINLESS-STEEL FINISH**

- A. Grind and polish surfaces to produce uniform, directional satin finish matching No. 4 finish, with no evidence of welds and free of cross scratches. Run grain with long dimension of each piece, when polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces clean.

**PART 3 – EXECUTION**

**3.1 EXAMINATION**

**SECTION 12 3616  
METAL COUNTERTOPS**

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of metal countertops.
  - B. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.2 INSTALLATION
- A. Install metal countertops level, plumb, and true; shim as required, using concealed shims.
  - B. Field Jointing: Where Possible, make field jointing in the same manner as shop jointing; use fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top edge surfaces is not required. Locate field joints were shown on Shop Drawings.
  - C. Secure tops to cabinets with Z- or L- type fasteners or equivalent; use two or more fasteners at each front, end, and back.
  - D. Abut top and edge surfaces in one true plane, with internal, supports places to prevent deflection.
  - E. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.
- 3.3 CLEANING AND PROTECTION
- A. Repair or remove and replace defective work as directed on completion of installation.
  - B. Clean finished surfaces, touch up as required, and remove or refinish damage or soiled areas to match original factory finish, as approved by Architect.
  - C. Protection: Provide 6-mil plastic or other suitable water-resistant covering over the countertop surfaces. Tape to underside of countertop at a minimum of 48 inches O.C. Remove protection at Substantial Completion.

END OF SECTION

**SECTION 13 3419  
METAL BUILDING**

**PART 1 - GENERAL**

**BACKGROUND**

**PROPOSED DESIGN:** This building shall be for the County of San Bernardino Special Districts Division and located at the Wonder Valley Community Center.

The intent is to construct an equipment enclosure building with appurtenances (doors, minimal ventilation, and lighting for maintenance. The building shall accommodate the existing and new equipment per the architectural drawings.

The architectural and plumbing engineering drawings shall serve as the reference regarding loads, dimensions, and appurtenances.

**THE REQUIREMENT-**

**GENERAL:** Design-, fabricate, supply, and erect a metal building for equipment enclosure purposes with nominal dimensions of approximately 12-feet by 26 feet.

The building size and shape shall match that of the architectural plans.

This includes roof slope.

This includes the building location.

The building shall have appurtenances such as doors, vents, and lightning.

Construction of the building foundation footings and concrete slab are included in the scope. The foundation and slab shall match the architectural plans with the exception of any specific footing and anchorage requirements needed for the metal building foundation.

This includes the approaches to the swing doors as shown on the architectural plans.

**REFERENCES**

MBMA, Metal Building Systems Manual, Metal Building Manufacturers Association

AISC S100, North American Specification for the Design of Structural Members, American Institute of Steel Construction

AISC 360, Specification for Structural Steel Buildings, American Institute of Steel Construction

AISC, Steel Design Guide Series 3, Serviceability Design Considerations for Low-Rise Buildings, , American Institute of Steel Construction

ASTM A36, Standard, "Specification for Carbon Structural Steel"

ASTM A153, Standard, "Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware"

ASTM A307-07b, Standard, "Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength"

ASTM A325/10, Standard, "Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength."

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ASTM A463-006, Standard, "Specification for Steel Sheet, Aluminum-Coated by the Hot-Dip Process"

ASTM A475-03, Standard "Specification for Zinc-Coated Steel Wire Strand"

ASTM A49010a, Standard, "Specification for heat Treated Steel Structural Bolts, 150ksi Minimum Tensile Strength."

ASTM A50010, Standard, "Specification for Cold-Formed Welded and Seamless Structural Tubing in Rounds and Shapes"

ASTM A501-07, Standard, "Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing"

ASTM A529, Standard, "Specification for High-Strength Carbon Manganese Steel of Structural Quality"

ASTM A572, Standard "Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel"

ASTM A653, Standard "Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process"

ASTM A792. Standard "Specification for Steel Sheet, 55% Aluminum Zinc Alloy-Coated by the Hot-Dip Process"

ASTM A1011, Standard "Specification for Steel Sheet and Strip Hot Rolled Carbon, Structural High Strength Low-Alloy and High Strength Low-Alloy with Improved Formability"

ASTM C665, Standard "Specification for Mineral-Fiber Insulation for Light Frame Construction and Manufactured Housing"

ASTM E1514 Standard, "Specification for Structural Standing Seam Steel Roof Panel Systems"

ASTM E159205, Standard, "Specification for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference"

ASTM E1646 Standard, "Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Differences"

ASTM E1680, Standard "Test Method of Rate of Air Leakage through Exterior Metal Roof Panel Systems"

AWS A2.4, Standard Welding Symbols

AWS D1., Structural Welding Code, Steel

AA. AWS D1.3, Structural Welding Code, Sheet Steel

BB. NAIMA 202, Standard for Flexible Fiberglass Insulation Systems in Metal Buildings

CC. Steel Joist Institute (SJI) – Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders

DD. Society for Protective Coatings (SSPC) SP-2- Specification for Hand Tool Cleaning (Part of Steel Structures Painting Manual)

EE. SSPC, Paint 20 Zinc-Rich Primers (Type I "Inorganic", and Type II Organic" FF. AI. UL 580 – Tests for Uplift Resistance of Roof Assemblies

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GG. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights

HH. Electrical. Codes and Standards:

NEC National Fire Protection Agency (NFPA) – 70 National Electrical Code (NEC), latest adopted version.

CCR Title 8, Industrial Relations, Subchapter 5, Electrical Safety Orders, California Code of Regulations

Electrical Commercial Standards:

ANSI B16.5 Pipe Flanges and Flanged Fittings, Steel, Nickel Alloy, and Other Special Alloys.

ANSI C80.1 Rigid Steel Conduit, Zinc Coated, specification for.

ANSI/UL 467 Grounding and Bonding Equipment, Safety Standard

NEMA WD-1-1.10 General Requirements for Wiring Devices.

NEMA AB-1 Molded Case Circuit Breakers

NEMA PB-1 Panelboards.

NEMA KS-1 Enclosed Switches 9. ICEA S-66-524

ICEA S-61-402 Thermoplastic - Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

ICEA S-19 Rubber - Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

JJ. CONCRETE STANDARDS

ACI 117 Standard Tolerances for Concrete Construction Materials

ACI 211.1 Selecting Proportions for Normal, Heavyweight, and Mass Concrete

ACI 214 Evaluation of Strength Test Results for Concrete

ACI 301 Structural Concrete for Buildings

ACI 304 Measuring, Mixing, Transporting, and Placing Concrete

ACI 305 Hot Weather Concreting

ACI 309 Consolidation of Concrete

ACI 318 Building Code Requirements for Reinforced Concrete

ASTM C31 Making and Curing Concrete Test Specimens in Field

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ASTM C33 Concrete Aggregates

ASTM C39 Compressive Strength of Cylindrical Concrete Specimens

ASTM C94 Ready-Mixed Concrete

ASTM C150 Portland Cement

**DESIGN REQUIREMENTS**

System: The building shall be designed by the manufacturer as a complete system. All components of the system shall be supplied or specified by the same manufacturer.

Codes: The design be in accordance with ASCE 7 and the California Building Code, 2019 Edition. The design will be subject to review by The County of San Bernardino's Special Districts structural consultant and the project architect.

Design Loads: The dead load shall be the weight of the Metal Building System and as determined by the system manufacturer. Live loads and lateral loads, including seismic, and wind, shall be in accordance with those shown on the reference ARCON plans, Sheet 2, General Notes. The manufacturer shall determine if additional load requirements are necessary due to the blowers, doors, or other appurtenances. The entire building envelope shall be designed to take the design load. This includes roofing, siding, doors. The County will not be utilizing the framing for hoists or hanging equipment. Appurtenances: The system shall be designed with door, roof pitch, and any other appurtenances as shown on the architectural plans. This includes location, size, clearances, and equal products.

Structural shapes of proper design and size shall be designed to reinforce openings and to carry imposed loads.

Thermal effects: Standing Seam roof panels shall be free to move in response to expansion and contractions forces resulting from temperature variations. Assembly to permit movement of components without buckling, failure of joint seals, undue stress on fasteners, or other detrimental effects, when subject to an annual extreme temperature range of 24 to 112 degrees Fahrenheit and 45 degrees daily.

Consider the site features and adjacent buildings in the design.

Provide for a neat, architectural appearance.

**SUBMITTALS**

Engineering: All manufacture drawings and design calculations shall bear the professional seal and signature of a licensed professional engineer registered in the State of California. Design calculations and notes shall be submitted.

Submit anchor bolt placement plans, column reactions, and specific footing requirements in advance of the erection drawings. Architect and engineer will finalize the slab and foot design based upon accepted submittals.

Shop and/or Erection Drawings: Indicate assembly dimensions, locations of structural members, connections, attachments, openings, cambers, loads and appurtenance assemblies; wall and roof system dimensions, panel layout, general construction details, anchorages and method of anchorage, installation: framing anchor bolt settings, sizes, and locations from datum, foundation loads; indicate field weld connections with AWS A2.4 welding symbols, indicate net weld lengths.

Concrete: Submit concrete mix and source.

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METAL BUILDING**

Finishes: Submit information on finishes, paints, and trims for review and selection.

Appurtenances: Submit manufacturer information on doors, vents, exhaust fan, electrical (conduit, conductors, junction boxes, switches, and receptacles), lights, and sealants.

Manufacturer's Installation Instructions: Indicate preparation requirements, assembly sequence, and specific requirements.

**QUALITY ASSURANCE**

Fabricate structural steel members in accordance with MBMA Metal Building Systems Manual, and, for items not covered, AISC – Specification for Structural Steel Buildings.

**QUALIFICATIONS**

Manufacturer: The building manufacturer shall have a minimum of 7 years' experience in the manufacture of steel building systems.

Design: Structural framing and covering shall be the design of a licensed Professional Engineer experienced in design of this work.

Erector: Erector shall be a division of the steel building manufacturer or authorized and supervised by the steel building manufacturer. The erector shall have specialized experienced in the erection of steel building systems for a period of at least 5 years.

The contracting and contractor licensing requirements in the General Conditions must be met.

**FIELD MEASUREMENTS**

Verify that the field measurements are as indicated on the architectural drawings.

**WARRANTY**

Provide a building materials warranty of 15 years.

Provide a building workmanship warranty of 7 years in addition to the bonding requirements.

Provide and transfer all appurtenance's, such as doors, ventilation fan, and light fixtures, warranties to the County of San Bernardino.

**ADMINISTRATION**

Nomenclature shall conform to the MBMA Metal Building Systems Manual.

Coordination and administration of the work shall be in accordance with the MBMA Metal Building Systems Manual – Chapter IV Common Industry Practices.

**PART 2 - PRODUCTS**

**GENERAL:**

Manufacturer's standard fasteners must be compatible with panel material and performance level requirements.

**SECTION 13 3419  
METAL BUILDING**

**MATERIALS – ROOF SYSTEM**

Sheet Steel Stock: coated according to manufacturer's design to meet performance requirements.

Insulation: Minimum R value of 8, White Vinyl facing UL flame spread classification of 25 or less.

Through Fastened Roofing or Standing Seam Roofing, sealed to meet performance requirements and having a UL 580, Class 90 uplift rating. Minimum thickness per manufacturer's requirements to meet performance.

Soffit Panels: If used, minimum gauge to meet performance requirements; color as selected from manufacturer's standards.

Closures: Manufacturer's standard type, closed cell or metal.

Fasteners: Manufacturer's standard type, size and design to maintain load and weather tightness requirements.

Sealant: Manufacturer's standard type for performance requirements.

Exterior Surfaces of Roof Panels: Precoated steel of polyester or silicone polyester finish; color as selected from manufacturer's standard colors.

Interior Surfaces of Roof Panels: Precoated steel with wash coat of polyester, acrylic, or silicone polyester per manufacturer's standard finish.

**MATERIALS – FRAMING**

Per manufacturer's design meeting AISC standards.

Clean and prepare framing in accordance with SSPC-SP2 as a minimum. Framing members shall be factory primed with the manufacturer's standard rust-inhibiting primer.

Fabricate hot rolled members in accordance with AISC Specification for pipe, tube and rolled structural shapes.

Fabricated cold formed members in accordance with MBMA Metal Building Systems Manual, Chapter IV Common Industry Practices

Fabricate build-up members in accordance with MBMA Metal Building Systems Manual, Chapter IV Common Industry Practices.

**WALL SYSTEM**

Sheet Steel Stock: Galvanized coated to G90 or aluminum-zinc coated to Az55 as required by manufacturer's design.

Wall Insulation: Minimum R8, white vinyl facing, UI Flame spread of 25 or less.

Siding: Minimum metal thickness per manufacturer's design to meet performance requirements.

Liner: Minimum metal thickness per manufacturer's design to meet performance requirements.

Closures: Manufacturer's standard type, closed cell or metal.

**SECTION 13 3419  
METAL BUILDING**

Fasteners: Manufacturer's standard type. Size and design to maintain load and weather tightness requirements.

Exterior Surfaces of Wall Panels: Precoated steel of polyester, acrylic, or silicone polyester selected from manufacturer's standard colors.

Interior Surfaces of Wall Panels: Precoated steel with wash coat of polyester, acrylic, silicone polyester per manufacturer's standard finish.

**MATERIALS – TRIM**

Flashings, Internal and External Corners, Closure Pieces: Same material and finish as adjacent material, profile to suit system and color as selected from manufacturer's standards.

**MATERIALS – DOORS AND FRAMES**

**PERSONNAL DOOR**

The door and frame shall be designed to meet the wind load provisions. The door shall be designed using beam action to transfer loads from jamb to jamb. The door shall be furnished and installed completely and shall be equivalent to the door shown on the ARCON reference plans and schedule (Sheet 3). Panic hardware shall be furnished and installed with the door as shown in the schedule. The Door shall be finished equivalent to the requirements of the ARCON reference plans and schedule (Sheet 4)

**MATERERIALS LOUVERS**

Louvers shall be provided as shown on the referenced ARCON plans and AMCA 500-L. The louvers shall be wind-driven rain louver effectiveness "B".

Provide all hardware, sealants, and fasteners for installing the louvers.

**MATERIALS FOUNDATION, FOOTING AND SLAB**

**SLAB**

Concrete: Provide concrete in accordance with the REINFORCED CONCRETE plan notes on sheet 2 of the referenced ARCON plans and per any additional requirements in the final foundation design.

Reinforcing: Provide reinforcing in accordance with the REINFORNCING STEEL plan notes on sheet 2 of the referenced ARCON plans and any additional requirements in the final foundation design.

**FOUNDATION (FOOTING)**

Concrete: Provide per final design, based upon building manufacturer's requirements and as done by SCWD foundation engineer.

Reinforcing: Provide per final design, based upon building manufacturer's requirements and as done by SCWD foundation engineer.

Anchorage: Provide foundation anchors per final foundation design and the manufacturer's standard.

**MATERIALS ELECTRICAL**

**SECTION 13 3419  
METAL BUILDING**

Provide and install electrical conduit, receptacles, switches, and panel board as shown on the architectural plans.

All equipment furnished by the CONTRACTOR shall be listed by and shall bear the label of Underwriters' Laboratories, Incorporated, (UL) or of an independent testing laboratory acceptable to OCSD.

**OUTLET AND DEVICE BOXES**

General: Provide boxes not less than 2-inches deep, unless shallower boxes are required by structural conditions and are specifically accepted by the ENGINEER. Do not use box extensions to provide wiring space required by the NEC. For hollow masonry construction, provide boxes of sufficient depth so that conduit knockouts or hubs are in the masonry void space.

Provide heavy duty fiberglass device boxes and junction boxes. Provide fiberglass boxes with gasketed, watertight covers and stainless-steel screws. Provide boxes with conduit hubs and any required mounting lugs. Provide a box suitable for the conditions encountered at each outlet in the wiring or raceway system and sized in with the NEC. Use the listed types unless otherwise indicated or accepted.

**JUNCTION AND PULL BOXES**

Utilize NEMA 4X 316 stainless steel or fiberglass UV-rated watertight enclosures for outdoor locations.

**WIRING DEVICES**

**Switches**

General Use Switches: Provide specification grade, totally-enclosed, ac type, quiet tumbler switches meeting NEMA WD 1 performance standards and Federal Specification W-S-896E, and capable of control of 100 percent tungsten filament and fluorescent lamp loads. Use switches rated at 15 amps minimum, 120/277 volts. Switches shall have screw terminals.

**Receptacles**

Single. Duplex. Quad: Provide specification grade receptacles meeting NEMA WD performance standards and Federal Specification W-C-596 and having a contact arrangement such that contact is made on two sides of each inserted blade without detent. Use two-pole, three-wire grounding type receptacles with screw wire terminals.

Device Plates: Provide plates fitting closely and tightly to the box on which they are to be installed. On surface mounted boxes, provide plates, which do not extend beyond the sides of the box unless the plates do not have sharp corners or edges.

**PANELBOARD.**

General: Provide circuit breaker panelboard meeting standards established by UL, NEMA PB 1, and the NEC. Provide panels UL labeled for that use. Provide

panelboards and circuit breakers suitable for use with 75 degrees C wire at full NEC 75 degrees C ampacity.

Cabinets: Furnish boxes large enough to provide a minimum wiring gutter space on both sides and top and bottom of 4-inches by 4-inches minimum. Provide flush or surface mounted boxes as indicated manufactured with reinforced steel frame and code-gauge, hot-dip galvanized sheet steel. Utilize front trim the same size as the box for surface mounted panelboards and 3/4-inch larger all around than the box for flush mounted panelboards. Panel covers shall be installed with direct screw connections.

**SECTION 13 3419  
METAL BUILDING**

Adjustable clamps shall not be used. Utilize fronts having doors with concealed hinges and flush type lock and catch device.

Circuit Breakers: Furnish indicating type molded circuit breakers providing ON/OFF and TRIPPED positions of the operating handle. Furnish thermal magnetic, quick-make, quick-break circuit breakers which are noninterchangeable in accordance with NEC. Do not use tandem or dual circuit breakers in normal single-pole spaces. Do not use single-pole circuit breakers with handle ties where multiple circuit breakers are indicated. Provide circuit breakers meeting requirements of NEMA AB 1.

**LIGHTS.**

Wall Pack Units: Provide exterior LED wall pack units as shown on sheets 3 and 10 of referenced ARCON plans. Provide Lithona or equal, as selected by SCWD.

Lamps: Provide ceiling mounted LED lamps as shown on sheet 10 of referenced ARCO plans. Provide as specified in lighting fixture schedule or equal,

**PART 3 - EXECUTION**

**EXECUTION GENERAL**

Verify site conditions prior to design. Verify that the foundation, floor slab, and anchors are placed correctly and properly squared before erection. Correct unsatisfactory conditions. Provide access to the work for inspection by SCWD. Material Handling, Delivery, and Storage

Prefabricated components, sheets, panels, and other manufactured items shall be delivered and stored so that they cannot be damaged or deformed.

If subjected to water accumulation, materials shall be stored in such a manner so that they can drain freely.

Sheets and panels shall not be stored in contact with other materials that might cause staining or corrosion.

**SLAB AND FOUNDATION/FOOTING CONSTRUCTION**

**SLAB**

Concrete: Construct per REINFORCED CONCRETE plan notes sheet 2 of ARCON reference plans and referenced standards.

Reinforcing Steel: Place reinforcing steel per REINFORCING STEEL plan notes sheet 2 of ARCON reference plans and referenced standards.

**FOUNDATION/FOOTING**

General: Construct per final foundation plan as completed by SCWD's Engineer and based upon building manufacturer's requirements.

Concrete: Construct per final foundation plan and per referenced standards.

Reinforcing Steel: Construct per final foundation plan and per referenced standards.

Anchors: Place anchors per final design. Verify placement prior to placing concrete.

**SECTION 13 3419  
METAL BUILDING**

**ERECTION FRAMING**

Erect framing in accordance with MBMA Metal Building Systems Manual, Chapter IV Common Industry Practices and instruction provided by fabricator.

Use templates for accurate setting of anchor rods. When required, level bearing plate area with steel wedges, shims, or grout. Check all previously placed anchorages.

Erect building frame true and level with vertical members plum and bracing properly installed. Maintain structural stability of frame during erection.

Ream holes requiring enlargement to admit bolts. Burned holes for bolted connections are not permitted.

Tighten bolts and nuts in accordance with "Specifications for Structural Joints Using High-Strength Bolts."

Furnish temporary guys and bracing where needed for squaring, plumbing and securing the structural framing against loads due to erection and erection operation. Bracing furnished by the manufacturer cannot be assumed to be adequate during erection and is not to be used to pull frames into plumb condition. The temporary guys, braces, falseworks, and cribbing shall be removed upon completion.

Do not field cut or modify structural members without approval of the metal building manufacturer.

After erection, prime welds, abrasions, and surfaces needing touchup.

**ERECTION – WALL AND ROOFING SYSTEMS**

Install all wall and roofing systems in accordance with manufacturer's instructions and details.

Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface. Protect factory finishes from damage.

Fasten cladding system to structural supports, using proper fasteners that are aligned level and plumb.

Set purlins and girts at right angle and bolt to appropriate clips. Attach clips as required to satisfy design loads and as shown on erection drawings.

Place screw down roof panels at right angle to purlins and girts. Attach and plumb wall panels as shown on erection drawings. Maintain consistent module overage for entire length of wall. Apply roof panel side and end lap sealant between panel ends and side laps to provide water-tight installation.

Place standing seam roof panels at right angle to purlins. Attach with sliding concealed clip where expansion and contraction must be accounted for. Lap panel ends per manufacturer's standard and panel notch. Place end laps above purlin with backup plate so panel end-lap fasteners do not penetrate purlin. Follow manufacturer's instructions for fastening and sealing end laps.

**ERECTION – FLASHINGS AND TRIM**

Install flashings and trim in strict accordance with manufacturer's instructions, using proper sheet metal procedures. Gutters, downspouts, ventilator louvers, and other sheet metal accessories shall be installed in a manner that provides positive anchorage to building and weather-tight mounting.

Sealants" Apply continuously and in accordance with sealant manufacturer's recommendations.

**INSULATION**

**SECTION 13 3419  
METAL BUILDING**

Insulation shall be installed concurrently with installation of roof and wall panels.

Insulation shall be located on inside of roof and wall sheets, extending across the flange of purlin or girt members and held taut and snug to panels with retainer clips.

Retainer strips shall be installed at each longitudinal joint in such a manner that the strips are straight and taut and can hold the insulation firmly in place.

**DOORS**

**PERSONNAL**

Doors, frames, and related hardware shall be installed in accordance with manufacturer's instructions and industry standards.

Frames shall be securely anchored to building structure.

Hardware shall be adjusted to provide proper operation.

**LOUVERS**

Framed openings shall be securely attached to building structural framing.

Perimeter of each unit shall be sealed with the elastomeric sealant used for panels.

The operating louvers hardware shall be adjusted and lubricated, if required, to provide proper operation.

**ELECTRICAL CONSTRUCTION**

**GENERAL:** Refer to notes on sheet 9 of ARCON reference plans. Follow referenced electrical codes and standards. Insurance work is neat and tidy. Locate switches, lights, and receptacles as shown on ARCON reference plans.

**OUTLET RECEPTACLES AND DEVICE BOXES**

Locations indicated are approximate. Study the Drawings in relation to spaces and outlet surroundings. When necessary, with the approval of the ENGINEER, relocate outlets to avoid interference with structural features.

Mount all boxes plumb and level. Use surface mounted boxes with surface mounted conduits.

Install boxes in a secure, substantial manner supported independently of conduit by attachment to the building structure or a structural member. Fasten boxes with bolts and machine screws or welded, threaded studs on steelwork. Boxes embedded in concrete.

Provide lighting fixtures with separate junction boxes. Where boxes support fixtures, provide proper means of attachment with adequate strength.

Open no more knockouts in boxes than are required. Seal any used openings in box.

**JUNCTION AND PULL BOXES**

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METAL BUILDING**

Where indicated on the Drawings, and where necessary to terminate, tap-off, or redirect multiple conduit runs, provide and install appropriately designed junction boxes. Furnish and install pull boxes where necessary in the raceway system to facilitate conductor installation.

Make all boxes accessible. Do not install boxes in finished areas unless accepted by the ENGINEER. Mount all boxes plumb and level.

Mount boxes in a secure, substantial manner, supported independently of conduit by attachment to the building structure or a structural member. Fasten boxes with bolts machine screws or welded threaded studs on steelwork.

**WIRING DEVICES**

Switches: Mount switches at the accessible locations and heights. Mount switches for switch operation in the vertical position

Receptacles: Mount receptacles at heights indicated on the plans or as directed by Inspector. Ground receptacles to boxes with grounding wire, not by yoke or screw contact.

Install and mount the receptacles in accordance with the manufacturer's instructions and the applicable codes.

**PANELBOARD**

Mount panelboard securely where indicated, plumb, in-line, and square with walls. Unless otherwise indicated, mount panelboard with top of its cabinet approximately 6-feet above the floor. Provide a typewritten circuit directory under a metal-framed transparent plastic cover inside panelboard.

**TOLERANCES**

All work shall be performed by experienced workmen in a workmanlike manner to published tolerances.

Install framing in accordance with MBMA Metal Building Systems Manual, Chapter IV Common Industry Practices.

**CLEANING AND TOUCH-UP**

All component surfaces shall be cleaned. Abrasions, marks, skips, and other defects to finished surfaces shall be touched up with the same type of finish.

**SECTION 22 0500  
PLUMBING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Waterproofing.
  - 2. Electrical Connections and Protection.
  - 3. Supports and anchors.
  - 4. Cleaning, Protection and Adjustment.
  - 5. Dielectric Fittings.
  - 6. Piping connections.
  - 7. Mechanical Identification.
  - 8. Sleeves and Seals.
  
- B. Related Documents: The Contract Documents, as defined in Section 01 10 00 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
  
- C. Related Sections:
  - 1. 07 92 00 - Joint Sealants: Sealants.
  - 2. 09 91 00 - Painting: Field painting.

**1.2 WATERPROOFING**

- A. Where work penetrates waterproofing, including waterproof concrete, the method of installation shall be approved by the Engineer prior to performing the work. Furnish necessary sleeves, caulking and flashing required to make openings watertight.

**1.3 ELECTRICAL CONNECTIONS AND PROTECTION**

- A. Regardless of voltage, provide control wiring, interlock wiring, and equipment control wiring for the equipment provided under this division of the specifications.
  
- B. Furnish electrical disconnect switches, starters and combination starter disconnects required for equipment provided under this division of the specifications. Circuit breakers furnished shall be rated for motor protection.
  
- C. Power wiring not used for control functions, complete from power source to motor or equipment junction box, including power wiring through starters, shall be provided under Division 26.
  
- D. Coordinate to ensure that electrical devices furnished or provided are compatible with the electrical systems used.
  
- E. Confirm final location of electrical equipment to be installed in the vicinity of piping.

**1.4 PAINTING**

- A. Painting requirements of this section shall conform to Division 9 – Finishes: Painting.
  
- B. Provide surface preparation, priming, and final coat application in strict accordance with manufacturer's recommendations.

**SECTION 22 0500  
PLUMBING**

- C. Provide field painting of systems, equipment and miscellaneous metals located outdoors. Application shall be in strict accordance with manufacturer's recommendations.
- D. Provide painting of plumbing piping and equipment exposed in mechanical equipment room and in occupied spaces. Plumbing items to be painted are as follows:
  - 1. Piping, pipe hangers, pipe insulation, and supports
  - 2. Equipment and supports.
  - 3. Accessory items.

1.5 CLEANING, PROTECTION AND ADJUSTMENT

- A. Cleaning
  - 1. General cleaning requirements are specified in Division 1 – General Requirements.
  - 2. Upon completion of the work, clean the exterior surface of equipment, accessories, and trim installed. Clean, polish, and leave equipment, accessories, and trim in first-class condition.
- B. Protection of Surfaces
  - 1. Protect surfaces from damage during the construction period.
  - 2. Provide plywood or similar material under equipment or materials stored on floors or roofs. Provide protection in areas where construction may damage surfaces.
  - 3. Surfaces damaged during the construction shall be repaired or replaced at no additional cost to the County. The method of repairing or replacing the surface shall be approved by the Engineer.
- C. Protection of Services
  - 1. Protect services from damage during the construction period.
  - 2. Repair, replace and maintain utilities, facilities, or services (underground, above ground, interior or exterior) damaged, broken or otherwise rendered inoperative during construction.
  - 3. Services damaged during the construction shall be replaced at the cost of the Contractor at fault. The method used in repairing, replacing, or maintaining the services shall be approved by the Engineer.
- D. Protection of Equipment and Materials
  - 1. Equipment and materials shall be stored in a manner that shall maintain an orderly, clean appearance. If stored on-site in open or unprotected areas, equipment and material shall be kept off the ground and out of standing water by means of pallets or racks and covered with tarpaulins.
  - 2. Equipment and material, if left unprotected and damaged, shall be repainted, or otherwise refurbished at the discretion of the Owner. Equipment and material are subject to rejection and replacement if, in the opinion of the Engineer or manufacturer the equipment has deteriorated or been damaged to the extent that its immediate use or performance is questionable, or that its normal life expectancy has been curtailed.
  - 3. During the construction period, protect piping, fittings, valves, equipment, and associated appurtenances from damage and dirt. Each system of piping shall be flushed to remove grit, dirt, sand, and other foreign matter for as long a time as required to thoroughly clean the systems.
- E. Adjustment
  - 1. After the entire installation has been completed, make required adjustments to balancing valves, circulating systems, pressure reducing valves and similar devices until performance requirements are met.

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PLUMBING**

2. Provide factory-lubricated bearings for equipment. Before initial startup of equipment, inspect and verify bearings for proper amounts of lubricant. If required, provide proper amounts of lubricant in accordance with manufacturer's recommendations.

1.6 DIELECTRIC FITTINGS

- A. Ferrous to non-ferrous pipe connections shall be made with threaded, soldered, plain, or welded end connections that match piping system material. Dielectric fittings shall prevent any electrolytic action between dissimilar materials.

1.7 PIPING CONNECTIONS

- A. Make pipe connections according to the following
  1. Provide unions in supply piping systems 4 inches and smaller:
    - a. Adjacent to each side of valve
    - b. At final connection to equipment
  2. Provide flanged connections for supply piping systems 4 ½ inches and larger:
    - a. Adjacent to each side of valve
    - b. At final connection to equipment
  3. Provide sewer lateral cleanout:
    - a. As indicated on Plans.

1.8 SLEEVES AND SEALS

- A. Sleeves for Pipes through Non-fire Rated Floors: 18 gage (1.2 mm thick) galvanized steel.
- B. Sleeves for Pipes through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage (1.2 mm thick) galvanized steel.
- C. Sleeves for Round Ductwork: Galvanized steel.
- D. Sleeves for Rectangular Ductwork: Galvanized steel or wood.
- E. Sealant: refer to Section 07 92 00 – Joint Sealants.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
  1. Grinnell.
  2. Elcen.
  3. Fee and Mason.
  4. Kin-Line.
  5. Michigan.
  6. Unistrut.
  7. Or approved equal.
- B. Plumbing Piping - DWV:
  1. Conform to ASTM F708.
  2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch (13 to 38 mm): Malleable iron, adjustable swivel, split ring.

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3. Hangers for Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.
4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe Sizes to 3 Inches (75 mm): Cast iron hook.
6. Wall Support for Pipe Sizes 4 Inches (100 mm) and Over: Welded steel bracket and wrought steel clamp.
7. Vertical Support: Steel riser clamp.
8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

C. Plumbing Piping - Water:

1. Conform to ASTM F708.
2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch (13 to 38 mm): Malleable iron adjustable swivel, split ring.
3. Hangers for Cold Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 2 to 4 Inches (50 to 100 mm): Carbon steel, adjustable, clevis.
5. Hangers for Hot Pipe Sizes 6 Inches (150 mm) and Over: Adjustable steel yoke, cast iron roll, double hanger.
6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches (150 mm) and Over: Steel channels with welded spacers and hanger rods, cast iron roll.
8. Wall Support for Pipe Sizes to 3 Inches (76 mm): Cast iron hook.
9. Wall Support for Pipe Sizes 4 Inches (100 mm) and Over: Welded steel bracket and wrought steel clamp.
10. Wall Support for Hot Pipe Sizes 6 Inches (150 mm) and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast-iron roll.
11. Vertical Support: Steel riser clamp.
12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
13. Floor Support for Hot Pipe Sizes to 4 Inches (100 mm): Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
14. Floor Support for Hot Pipe Sizes 6 Inches (150 mm) and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
15. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.2 PIPE HANGER AND SUPPORT SCHEDULE

PIPE SIZE Inches (mm)	MAX. HANGER SPACING Feet (m)	HANGER ROD DIAMETER Inches (mm)
1/2 to 1-1/4 (12 to 32)	6.5 (2)	3/8 (9)
1-1/2 to 2 (38 to 50)	10 (3)	3/8 (9)
2-1/2 to 3 (62 to 75)	10 (3)	1/2 (13)
4 to 6 (100 to 150)	10 (3)	5/8 (15)
8 to 12 (200 to 300)	14 (4.25)	7/8 (22)

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PVC (All Sizes)	6 (1.8)	3/8 (9)
C.I. Bell and Spigot (or No-Hub) and at Joints	5 (1.5)	1/2 (13)

**2.3 PROTECTION OF ELECTRICAL EQUIPMENT**

- A. Plan and arrange overhead piping to avoid dedicated electrical space that may include motors, controllers, switchboards, panel boards, or similar equipment.
  - 1. Dedicated electrical space is equal to the width and depth of the electrical components and extends from the floor to a height of 6 feet above the electrical components or to the structural ceiling, whichever is lower. No piping, leak detection apparatus, equipment, components, or associated appurtenances foreign to the electrical installation shall be in the dedicated electrical space.
  - 2. Dropped, suspended, or any other type of ceiling that does not add strength to the building structure cannot be provided as a separation between dedicated electrical spaces for the installation of foreign components within the dedicated electrical space.
- B. Where the installation of foreign components occurs above the dedicated electrical space (6 feet above the electrical systems), contractor shall provide a means of secondary containment to prevent damage to the electrical systems.
- C. Secondary Containment Piping System
  - 1. Piping system shall consist of clear unpigmented Polyvinyl Chloride pipe and fittings. The containment piping system shall be longitudinally split. The pipe shall align via a tongue and groove and the fittings shall be manufactured in two halves.
  - 2. The pipe and fitting shall be temporarily held together by clips affixed over top of integral fitting clip locators. Final system joining shall be provided by welding components together via an injection bonding process.
  - 3. Final containment inspection shall be provided via a low-pressure air test per manufacturer's requirements.

**2.4 DIELECTRIC FITTINGS**

- A. Dielectric unions shall be factory – fabricated assemblies with a minimum working pressure as required to suit system pressures.
- B. Dielectric flanges shall be factory – fabricated, companion flange assemblies with a minimum working pressure as required to suit system pressures.
- C. Dielectric flange kits shall be field – fabricated with a minimum working pressure as required to suit system pressures. Kit shall include flanges, full face type phenolic gasket, phenolic bolt sleeves, phenolic washers, and steel backing washers.
- D. Dielectric couplings shall be galvanized steel with inert and noncorrosive, thermoplastic lining, threaded ends and a minimum working pressure as required to suit system pressures.
- E. Dielectric nipples shall be electroplated steel nipple with unert and noncorrosive, thermoplastic lining, plain, threaded, or grooved ends and a minimum working pressure as required to suit system pressures.
- F. Acceptable Manufacturers:
  - 1. Watts Industries
  - 2. Zurn Industries

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3. Sioux Chief Industries
4. Or approved equal.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Section 01 70 00 - Execution and Closeout Requirements: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates, and conditions are as required, and ready to receive Work.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected and approved by the Engineer.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the County.

**3.2 PREPARATION - MECHANICAL IDENTIFICATION**

- A. Degrease and clean surfaces to receive adhesive for identification materials.

**3.3 INSTALLATION - GENERAL**

- A. Install in accordance with manufacturer's instructions.
- B. The use of lead-containing solder for plumbing and plumbing fixtures is prohibited in the construction of this project.

**3.4 INSTALLATION - PIPE HANGER AND SUPPORTS**

- A. Support horizontal piping as scheduled.
- B. Install hangers to provide minimum 1/2-inch (13 mm) space between finished covering and adjacent work.
- C. Place hangers within 12 inches (300 mm) of each horizontal elbow.
- D. Use hangers with 1-1/2 inch (38 mm) minimum vertical adjustment.
- E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet (1.5 m) maximum spacing between hangers.
- F. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- G. Support riser piping independently of connected horizontal piping.
- H. Provide copper plated hangers and supports for copper piping.
- I. Design hangers for pipe movement without disengagement of supported pipe.

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- J. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

**3.5 INSTALLATION - MECHANICAL IDENTIFICATION**

- A. Install identifying devices after completion of coverings and painting.
- B. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.
- C. Install tags using corrosion resistant chain. Number tags consecutively by location.
- D. Install underground plastic pipe markers 6 to 8 inches (150 to 200 mm) below finished grade, directly above buried pipe.
- E. Identify control panels and major control components outside panels with plastic nameplates.
- F. Identify valves in main and branch piping with tags.
- G. Identify piping, concealed or exposed, with plastic pipe markers and plastic tape pipe markers. Use tags on piping 3/4-inch (20 mm) diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet (6 m) on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.

Payment for all items of work identified in Division 22 in the plans and these specifications will be based on the lump sum pricing for items identified as Plumbing in the Bid Schedule. No additional Compensation will be allowed.

**END OF SECTION**

**SECTION 22 0513**  
**BASIC PLUMBING MATERIAL AND METHODS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Waterproofing.
  - 2. Electrical Connections and Protection.
  - 3. Supports and anchors.
  - 4. Cleaning, Protection and Adjustment.
  - 5. Dielectric Fittings.
  - 6. Piping connections.
  - 7. Mechanical Identification.
  - 8. Sleeves and Seals.
  
- B. Related Documents: The Contract Documents, as defined in Section 01 1000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
  
- C. Related Sections:
  - 1. 07 9200 - Joint Sealants: Sealants.
  - 2. 09 9100 - Painting: Field painting.

**1.2 WATERPROOFING**

- A. Where work penetrates waterproofing, including waterproof concrete, the method of installation shall be approved by the Engineer prior to performing the work. Furnish necessary sleeves, caulking and flashing required to make openings absolutely watertight.

**1.3 ELECTRICAL CONNECTIONS AND PROTECTION**

- A. Regardless of voltage, provide control wiring, interlock wiring, and equipment control wiring for the equipment provided under this division of the specifications.
  
- B. Furnish electrical disconnect switches, starters and combination starter disconnects required for equipment provided under this division of the specifications. Circuit breakers furnished shall be rated for motor protection.
  
- C. Power wiring not used for control functions, complete from power source to motor or equipment junction box, including power wiring through starters, shall be provided under Division 26.

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- D. Coordinate to ensure that electrical devices furnished or provided are compatible with the electrical systems used.
- E. Confirm final location of electrical equipment to be installed in the vicinity of piping.

**1.4 PAINTING**

- A. Painting requirements of this section shall conform to Division 9 – Finishes: Painting.
- B. Provide surface preparation, priming, and final coat application in strict accordance with manufacturer's recommendations.
- C. Provide field painting of systems, equipment and miscellaneous metals located outdoors. Application shall be in strict accordance with manufacturer's recommendations.
- D. Provide painting of plumbing piping and equipment exposed in mechanical equipment room and in occupied spaces. Plumbing items to be painted are as follows:
  - 1. Piping, pipe hangers, pipe insulation, and supports
  - 2. Equipment and supports.
  - 3. Accessory items.

**1.5 CLEANING, PROTECTION AND ADJUSTMENT**

- A. Cleaning
  - 1. General cleaning requirements are specified in Division 1 – General Requirements.
  - 2. Upon completion of the work, clean the exterior surface of equipment, accessories, and trim installed. Clean, polish, and leave equipment, accessories, and trim in first-class condition.
- B. Protection of Surfaces
  - 1. Protect surfaces from damage during the construction period.
  - 2. Provide plywood or similar material under equipment or materials stored on floors or roofs. Provide protection in areas where construction may damage surfaces.
  - 3. Surfaces damaged during the construction shall be repaired or replaced at no additional cost to the County. The method of repairing or replacing the surface shall be approved by the Engineer.
- C. Protection of Services
  - 1. Protect services from damage during the construction period.

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2. Repair, replace and maintain utilities, facilities or services (underground, above ground, interior or exterior) damaged, broken or otherwise rendered inoperative during the course of construction.
3. Services damaged during the construction shall be replaced at the cost of the Contractor at fault. The method used in repairing, replacing or maintaining the services shall be approved by the Engineer.

**D. Protection of Equipment and Materials**

1. Equipment and materials shall be stored in a manner that shall maintain an orderly, clean appearance. If stored on-site in open or unprotected areas, equipment and material shall be kept off the ground and out of standing water by means of pallets or racks, and covered with tarpaulins.
2. Equipment and material, if left unprotected and damaged, shall be repainted or otherwise refurbished at the discretion of the Owner. Equipment and material is subject to rejection and replacement if, in the opinion of the Engineer or manufacturer the equipment has deteriorated or been damaged to the extent that its immediate use or performance is questionable, or that its normal life expectancy has been curtailed.
3. During the construction period, protect piping, fittings, valves, equipment, and associated appurtenances from damage and dirt. Each system of piping shall be flushed to remove grit, dirt, sand, and other foreign matter for as long a time as required to thoroughly clean the systems.

**E. Adjustment**

1. After the entire installation has been completed, make required adjustments to balancing valves, circulating systems, pressure reducing valves and similar devices until performance requirements are met.
2. Provide factory-lubricated bearings for equipment. Before initial startup of equipment, inspect and verify bearings for proper amounts of lubricant. If required, provide proper amounts of lubricant in accordance with manufacturer's recommendations.

**1.6 DIELECTRIC FITTINGS**

- A.** Ferrous to non-ferrous pipe connections shall be made with threaded, soldered, plain, or welded end connections that match piping system material. Dielectric fittings shall prevent any electrolytic action between dissimilar materials.

**1.7 PIPING CONNECTIONS**

- A.** Make pipe connections according to the following
1. Provide unions in supply piping systems 4 inches and smaller:
    - a. Adjacent to each side of valve
    - b. At final connection to equipment
  2. Provide flanged connections for supply piping systems 4 ½ inches and larger:

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- a. Adjacent to each side of valve
- b. At final connection to equipment
- 3. Provide sewer lateral cleanout:
  - a. As indicated on Plans.

**1.8 SLEEVES AND SEALS**

- A. Sleeves for Pipes through Non-fire Rated Floors: 18 gage (1.2 mm thick) galvanized steel.
- B. Sleeves for Pipes through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage (1.2 mm thick) galvanized steel.
- C. Sleeves for Round Ductwork: Galvanized steel.
- D. Sleeves for Rectangular Ductwork: Galvanized steel or wood.
- E. Sealant: refer to Section 07 9200 – Joint Sealants.

**PART 2 - PRODUCTS**

**2.1 PIPE HANGERS AND SUPPORTS**

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
  - 1. Grinnell.
  - 2. Elcen.
  - 3. Fee and Mason.
  - 4. Kin-Line.
  - 5. Michigan.
  - 6. Unistrut.
  - 7. Or approved equal.
- B. Plumbing Piping - DWV:
  - 1. Conform to ASTM F708.
  - 2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch (13 to 38 mm): Malleable iron, adjustable swivel, split ring.
  - 3. Hangers for Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.
  - 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
  - 5. Wall Support for Pipe Sizes to 3 Inches (75 mm): Cast iron hook.
  - 6. Wall Support for Pipe Sizes 4 Inches (100 mm) and Over: Welded steel bracket and wrought steel clamp.
  - 7. Vertical Support: Steel riser clamp.

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8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

C. Plumbing Piping - Water:

1. Conform to ASTM F708.
2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch (13 to 38 mm): Malleable iron adjustable swivel, split ring.
3. Hangers for Cold Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 2 to 4 Inches (50 to 100 mm): Carbon steel, adjustable, clevis.
5. Hangers for Hot Pipe Sizes 6 Inches (150 mm) and Over: Adjustable steel yoke, cast iron roll, double hanger.
6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches (150 mm) and Over: Steel channels with welded spacers and hanger rods, cast iron roll.
8. Wall Support for Pipe Sizes to 3 Inches (76 mm): Cast iron hook.
9. Wall Support for Pipe Sizes 4 Inches (100 mm) and Over: Welded steel bracket and wrought steel clamp.
10. Wall Support for Hot Pipe Sizes 6 Inches (150 mm) and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
11. Vertical Support: Steel riser clamp.
12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
13. Floor Support for Hot Pipe Sizes to 4 Inches (100 mm): Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
14. Floor Support for Hot Pipe Sizes 6 Inches (150 mm) and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
15. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.2 PIPE HANGER AND SUPPORT SCHEDULE

PIPE SIZE Inches (mm)	MAX. HANGER SPACING Feet (m)	HANGER ROD DIAMETER Inches (mm)
1/2 to 1-1/4 (12 to 32)	6.5 (2)	3/8 (9)
1-1/2 to 2 (38 to 50)	10 (3)	3/8 (9)
2-1/2 to 3	10 (3)	1/2 (13)

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(62 to 75)

4 to 6 (100 to 150)	10 (3)	5/8 (15)
8 to 12 (200 to 300)	14 (4.25)	7/8 (22)
PVC (All Sizes)	6 (1.8)	3/8 (9)
C.I. Bell and Spigot (or No-Hub) and at Joints	5 (1.5)	1/2 (13)

**2.3 PROTECTION OF ELECTRICAL EQUIPMENT**

- A. Plan and arrange overhead piping to avoid dedicated electrical space that may include motors, controllers, switchboards, panel boards, or similar equipment.
1. Dedicated electrical space is equal to the width and depth of the electrical components and extends from the floor to a height of 6 feet above the electrical components or to the structural ceiling, whichever is lower. No piping, leak detection apparatus, equipment, components or associated appurtenances foreign to the electrical installation shall be located in the dedicated electrical space.
  2. Dropped, suspended, or any other type of ceiling that does not add strength to the building structure cannot be provided as a separation between dedicated electrical spaces for the installation of foreign components within the dedicated electrical space.
- B. Where the installation of foreign components occur above the dedicated electrical space (6 feet above the electrical systems), contractor shall provide a means of secondary containment to prevent damage to the electrical systems.
- C. Secondary Containment Piping System
1. Piping system shall consist of clear unpigmented Polyvinyl Chloride pipe and fittings. The containment piping system shall be longitudinally split. The pipe shall align via a tongue and groove and the fittings shall be manufactured in two halves.
  2. The pipe and fitting shall be temporarily held together by clips affixed over top of integral fitting clip locators. Final system joining shall be provided by welding components together via an injection bonding process.
  3. Final containment inspection shall be provided via a low pressure air test per manufacturer's requirements.

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**2.4 DIELECTRIC FITTINGS**

- A. Dielectric unions shall be factory – fabricated assemblies with a minimum working pressure as required to suit system pressures.
- B. Dielectric flanges shall be factory – fabricated, companion flange assemblies with a minimum working pressure as required to suit system pressures.
- C. Dielectric flange kits shall be field – fabricated with a minimum working pressure as required to suit system pressures. Kit shall include flanges, full face type phenolic gasket, phenolic bolt sleeves, phenolic washers, and steel backing washers.
- D. Dielectric couplings shall be galvanized steel with inert and noncorrosive, thermoplastic lining, threaded ends and a minimum working pressure as required to suit system pressures.
- E. Dielectric nipples shall be electroplated steel nipple with unert and noncorrosive, thermoplastic lining, plain, threaded, or grooved ends and a minimum working pressure as required to suit system pressures.
- F. Acceptable Manufacturers:
  - 1. Watts Industries
  - 2. Zurn Industries
  - 3. Sioux Chief Industries
  - 4. Or approved equal.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Section 01 7000 - Execution and Closeout Requirements: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected and approved by the Engineer.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the County.

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3.2 PREPARATION - MECHANICAL IDENTIFICATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.3 INSTALLATION - GENERAL

- A. Install in accordance with manufacturer's instructions.
- B. The use of lead-containing solder for plumbing and plumbing fixtures is prohibited in the construction of this project.

3.4 INSTALLATION - PIPE HANGER AND SUPPORTS

- A. Support horizontal piping as scheduled.
- B. Install hangers to provide minimum 1/2-inch (13 mm) space between finished covering and adjacent work.
- C. Place hangers within 12 inches (300 mm) of each horizontal elbow.
- D. Use hangers with 1-1/2 inch (38 mm) minimum vertical adjustment.
- E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet (1.5 m) maximum spacing between hangers.
- F. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- G. Support riser piping independently of connected horizontal piping.
- H. Provide copper plated hangers and supports for copper piping.
- I. Design hangers for pipe movement without disengagement of supported pipe.
- J. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.5 INSTALLATION - MECHANICAL IDENTIFICATION

- A. Install identifying devices after completion of coverings and painting.
- B. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.
- C. Install tags using corrosion resistant chain. Number tags consecutively by location.

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- D. Install underground plastic pipe markers 6 to 8 inches (150 to 200 mm) below finished grade, directly above buried pipe.
- E. Identify control panels and major control components outside panels with plastic nameplates.
- F. Identify valves in main and branch piping with tags.
- G. Identify piping, concealed or exposed, with plastic pipe markers and plastic tape pipe markers. Use tags on piping 3/4-inch (20 mm) diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet (6 m) on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.

Payment for all items of work identified in Division 22 in the plans and these specifications will be based on the lump sum pricing for items identified as Plumbing in the Bid Schedule. No additional Compensation will be allowed.

**END OF SECTION**

**SECTION 22 0522  
COMMON WORK RESULTS FOR PLUMBING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. This section includes the following:
  - A. Piping materials and installation instructions common to most piping systems.
  - B. Dielectric fittings.
  - C. Mechanical sleeve seals.
  - D. Sleeves.
  - E. Escutcheons.
  - F. Plumbing demolition.
  - G. Equipment installation requirements common to equipment sections.
  - H. Supports and anchorages.

**1.02 DEFINITIONS**

- A. Finished Spaces: Spaces other than plumbing and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and plumbing equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

**1.03 SUBMITTALS**

- A. Welding Certificates

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
  - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
  - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirement

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**PART 2 - PRODUCTS**

**2.01 PIPE, TUBE, AND FITTINGS**

- A. ASME B1.20.1 for factory-threaded pipe and pipe fittings.

**2.02 JOINING MATERIALS**

- A. Refer to individual Division 22 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.
- C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E. Brazing Filler Metals: AWS A5.8, BCuP Series or BAg1, unless otherwise indicated.
- F. Welding Filler Metals: Comply with AWS D10.12.
- G. Solvent Cements for Joining Plastic Piping:
  - 1. ABS Piping: ASTM D 2235.
  - 2. CPVC Piping: ASTM F 493.
  - 3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
  - 4. PVC to ABS Piping Transition: ASTM D 3138.

**2.03 DIELECTRIC FITTINGS**

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).
- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.
- E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).
- F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

**2.04 MECHANICAL SLEEVE SEALS**

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
- B. Sealing Elements: EPDM NBR interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
- C. Pressure Plates: Carbon steel Include two for each sealing element.

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- D. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

**2.05 SLEEVES**

- A. Galvanized-Steel Sheet: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
  - 1. Underdeck Clamp: Clamping ring with set screws.
- E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
- F. PVC Pipe: ASTM D 1785, Schedule 40.
- G. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

**2.06 ESCUTCHEONS**

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
  - 1. Finish: Polished chrome-plated.

**PART 3 - EXECUTION**

**3.01 PLUMBING DEMOLITION**

- A. Refer to Division 01 Section "Cutting and Patching" and Division 02 Section "Selective Structure Demolition" for general demolition requirements and procedures.
- B. Disconnect, demolish, and remove plumbing systems, equipment, and components indicated to be removed.
  - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
  - 2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
  - 3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
  - 4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
  - 5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

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COMMON WORK RESULTS FOR PLUMBING**

- C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

**3.02 PIPING SYSTEMS – COMMON REQUIREMENTS**

- A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors.
- M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
- N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
  - 1. Install steel pipe for sleeves smaller than 6 inches (150 mm) in diameter.
  - 2. Install cast-iron "wall pipes" for sleeves 6 inches (150 mm) and larger in diameter.
  - 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- O. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
  - 1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
- Q. Verify final equipment locations for roughing-in.
- R. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

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COMMON WORK RESULTS FOR PLUMBING**

**3.03 PIPING JOINT CONSTRUCTION**

- A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
  - 1. Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.
  - 2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
  - 3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
  - 4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
  - 5. PVC Nonpressure Piping: Join according to ASTM D 2855.
  - 6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.
- J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
- K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.
- L. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
  - 1. Plain-End Pipe and Fittings: Use butt fusion.
  - 2. Plain-End Pipe and Socket Fittings: Use socket fusion.
- M. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

**3.04 PIPING CONNECTIONS**

- A. Make connections according to the following, unless otherwise indicated:
  - 1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
  - 2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.
  - 3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
  - 4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

**SECTION 22 0522  
COMMON WORK RESULTS FOR PLUMBING**

3.05 EQUIPMENT INSTALLATION – COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

3.06 ERECTION OF METAL SUPPORTS AND ANCHORAGES:

- A. Refer to Division 05 Section "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

3.07 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor plumbing materials and equipment.
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

END OF SECTION

**SECTION 22 4000  
PLUMBING FIXTURES AND EQUIPMENT**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Water closets.
  - 2. Lavatories.
  - 3. Urinals.
  - 4. Sinks
  - 5. Faucets
  - 6. Grease Interceptors
  - 7. Protective shielding guards.
- B. Related Documents: The Contract Documents, as defined in Section 01 10 00 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
  - 1. Section 07 92 00 - Joint Sealants: Seal fixtures to walls and floors.
  - 2. Section 22 05 00 - Plumbing

**1.2 REFERENCES**

- A. American Society of Mechanical Engineers (ASME):
  - 1. ASME A112.18.1 - Finished and Rough Brass Plumbing Fixture Fittings.

**1.3 SUBMITTALS**

- A. Section 01 60 00 – Product Requirements, Product Data, and Samples: Procedures for submittals.
  - 1. Product Data:
    - a. Product Data: Provide catalogue illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
    - b. Provide submittals for all fixtures and equipment, and all associated trim and hardware.
- B. Section 01 78 00 – Closeout Submittals and 01 79 00 - Demonstration and Training: Procedures for closeout submittals.
  - 1. Project Record Documents: Accurately record the following:
    - a. Operation and Maintenance Data: Include fixture trim exploded view and replacement parts lists.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 – Product Requirements: Transport, handle, store, and protect Products.
- B. Only accept fixtures on site in factory packaging. Inspect for damage.
- C. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

**SECTION 22 4000  
PLUMBING FIXTURES AND EQUIPMENT**

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Drinking Fountain:
    - a. Elkay.
    - b. Hawley.
    - c. Or approved equal.
  2. Floor Drain:
    - a. J. R. Smith.
    - b. Or approved equal.
  3. Lavatory:
    - a. American Standard.
    - b. Or approved equal.
  4. One and Two Compartment Sinks:
    - a. Advance Tabco.
    - b. Elkay
    - c. Or approved equal.
  5. Hand Sink, Kitchen:
    - a. Elkay.
    - b. Or approved equal.
  6. Water closets:
    - a. American Standard.
    - b. b.ProFlo
    - c. Or approved equal.
  7. Urinal:
    - a. American Standard.
    - b. ProFlo
    - c. Or approved equal.
  8. Faucet (for Lavatory, Kitchen Sink, Mop Sink):
    - a. Chicago Faucet.
    - b. American Standard.
    - c. Or approved equal.
  9. Flush Valve:
    - a. American Standard.
    - b. Or approved equal.
  10. Grease Interceptor:
    - a. Zurn.
    - b. Or approved equal.
- B. Furnish and install Products as indicated in Drawings.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Section 01 70 00 - Execution and Closeout Requirements: Verification of existing conditions before starting work.

**SECTION 22 4000  
PLUMBING FIXTURES AND EQUIPMENT**

- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
  - 1. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
  - 2. Verify that electric power is available and of the correct characteristics.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected and approved by the Engineer.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the County.

**3.2 PREPARATION**

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

**3.3 INSTALLATION**

- A. Plumbing Fixtures:
  - 1. Install in accordance with manufacturer's instructions.
  - 2. Install each fixture with trap, easily removable for servicing and cleaning.
  - 3. Provide chrome plated rigid or flexible supplies to fixtures with screwdriver stops, reducers, and escutcheons.
  - 4. Install components level and plumb.
  - 5. Install and secure fixtures in place with wall carriers and bolts.
  - 6. Seal fixtures to wall and floor surfaces with sealant.
  - 7. Water Closets, Urinals and Lavatories: Provide adjustable cast iron fixture supports for all wall hung water closets, except where single vertical carriers in shallow walls occur.
  - 8. The use of lead-containing solder for plumbing and plumbing fixtures is prohibited in the construction of this project.
- B. Trap Primers
  - 1. Install primers under sinks and/or lavatories, and behind access panels out of line of sight. Provide access panels
  - 2. Trap primers to have approval of plumbing and drainage institute.
  - 3. Install trap primers in accordance with manufacturer's recommendations.
- C. Protective Shielding Guards
  - 1. Manufactured, plastic enclosure for covering hot- and cold-water supplies, trap and drain piping, and complying with ADA requirements and meeting ANSI code for barrier-free design. Provide at all accessible sinks and lavatories.

**3.4 ADJUSTING**

- A. Refer to Specification Section 01 70 00 – Execution and Closeout Requirements.
- B. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

**SECTION 22 4000  
PLUMBING FIXTURES AND EQUIPMENT**

3.5 CLEANING

- A. At completion clean plumbing fixtures and equipment.

3.6 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field testing and inspection.

Payment for items of work covered under Division 22 of the plans and these specifications shall be based on the lump sum bid pricing identified in the Bid Schedule. No additional compensation will be allowed.

**END OF SECTION**

NOT FOR BID

**SECTION 22 1116  
DOMESTIC WATER PIPING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
1. Aboveground domestic water pipes, tubes, fittings, and valve above grade and inside the building.
  2. Valves.
  3. Dielectric Fittings.
  4. Escutcheons.

**1.2 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Field quality-control reports.

**1.3 QUALITY ASSURANCE**

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 61 for potable domestic water piping and components.

**PART 2 - PRODUCTS**

**2.1 COPPER TUBE AND FITTINGS**

- A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.
1. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
  2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
  3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint ends.

**2.2 PIPING JOINING MATERIALS**

- A. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- B. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

**2.3 BALL VALVES**

- A. Manufacturers:
1. Grinnell Corporation.
  2. Other acceptable manufacturers offering equivalent products.
    - a. Hammond Valve.
    - b. Milwaukee Valve Company.

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DOMESTIC WATER PIPING**

- c. Red-White Valve Corporation.
  - d. Nibco.
  - e. Apollo.
  - f. Or equal.
- B. Up to 2 Inches: Bronze two-piece body, stainless or chrome plated steel ball, Teflon seats and stuffing box ring, lever handle solder or threaded ends. Note: Three-piece full port ball valves are recommended up to 3". Also recommended to add option for extended handle stem for insulated pipes.
- C. Over 2 Inches: Cast steel body, chrome plated steel ball, Teflon seat and stuffing box seals, lever handle, flanged.

**2.4 DIELECTRIC FITTINGS**

- A. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.
- B. Dielectric Unions:
- 1. Description:
    - a. Pressure Rating: 150 psig at 180 deg F.
    - b. End Connections: Solder-joint copper alloy and threaded ferrous.

**2.5 ESCUTCHEONS**

- A. General: Manufactured ceiling, floor, and wall escutcheons and floor plates.
- B. One Piece, Cast Brass: Polished, chrome-plated finish with setscrews.

**PART 3 - EXECUTION**

**3.1 PIPING INSTALLATION**

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."
- C. Install domestic water piping level and plumb.
- D. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated.
- E. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.
- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.

**SECTION 22 1116  
DOMESTIC WATER PIPING**

**3.2 JOINT CONSTRUCTION**

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."
- D. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

**3.3 DIELECTRIC FITTING INSTALLATION**

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
- B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.
- C. Dielectric Fittings for NPS 2-1/2 to NPS 64: Use dielectric flanges or flange kits.

**3.4 ESCUTCHEON INSTALLATION**

- A. Install escutcheons for penetrations of walls, ceilings, and floors.
- B. Escutcheons for New Piping:
  - 1. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep pattern.
  - 2. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish.

**3.5 FIELD QUALITY CONTROL**

- A. Perform tests and inspections.
- B. Piping Inspections:
  - 1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
  - 2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
    - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
    - b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
  - 3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
  - 4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- C. Piping Tests:
  - 1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.

**SECTION 22 1116  
DOMESTIC WATER PIPING**

2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
  3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
  4. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
  5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
  6. Prepare reports for tests and for corrective action required.
- D. Domestic water piping will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

**3.6 CLEANING**

- A. Clean and disinfect potable domestic water piping as follows:
1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
  2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
    - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    - b. Fill and isolate system according to either of the following:
      - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
      - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
    - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- B. Prepare and submit reports of purging and disinfecting activities.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION

**SECTION 22 1319  
SANITARY WASTE PIPING SPECIALTIES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section includes the following sanitary drainage piping specialties:
1. Cleanouts.
  2. Floor drains.
  3. Roof flashing assemblies.
  4. Miscellaneous sanitary drainage piping specialties.
  5. Flashing materials.

**1.2 SUBMITTALS**

- A. Product Data: For each type of product indicated.

**1.3 QUALITY ASSURANCE**

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

**PART 2 - PRODUCTS**

**2.1 CLEANOUTS**

- A. Cast-Iron Floor Cleanouts:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Josam Company; Josam Div.
    - b. Oatey.
    - c. Sioux Chief Manufacturing Company, Inc.
    - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
    - e. Tyler Pipe; Wade Div.
    - f. Watts Drainage Products Inc.
    - g. Zurn Plumbing Products Group; Light Commercial Operation.
    - h. Zurn Plumbing Products Group; Specification Drainage Operation.
  2. Standard: ASME A112.36.2M for adjustable housing cleanout.
  3. Size: Same as connected branch.
  4. Closure: Brass plug with straight threads and gasket OR cast-iron plug.
  5. Top Loading Classification: Light Duty.
  6. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.
- B. Cast-Iron Wall Cleanouts:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Josam Company; Josam Div.
    - b. MIFAB, Inc.

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- c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
  - d. Tyler Pipe; Wade Div.
  - e. Watts Drainage Products Inc.
  - f. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.36.2M. Include wall access.
  3. Size: Same as connected drainage piping.
  4. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
  5. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.

**2.2 FLOOR DRAINS**

**A. Cast-Iron Floor Drains:**

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Commercial Enameling Co.
  - b. Josam Company; Josam Div.
  - c. MIFAB, Inc.
  - d. Prier Products, Inc.
  - e. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
  - f. Tyler Pipe; Wade Div.
  - g. Watts Drainage Products Inc.
  - h. Zurn Plumbing Products Group; Light Commercial Operation.
  - i. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.6.3 with backwater valve, if required.
3. Body Material: Gray iron.
4. Backwater Valve: Integral, ASME A112.14.1, swing-check type, if required.
5. Coating on Interior and Exposed Exterior Surfaces: Acid-resistant enamel, where required.
6. Sediment Bucket:
7. Top or Strainer Material: Nickel bronze.
8. Top of Body and Strainer Finish: [Nickel bronze] [Polished bronze] [Rough bronze] <Insert finish>.
9. Top Shape: Square.
10. Top Loading Classification: Light Duty.

**2.3 ROOF FLASHING ASSEMBLIES**

**A. Roof Flashing Assemblies:**

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Acorn Engineering Company; Elmdor/Stoneman Div.
  - b. Thaler Metal Industries Ltd.

**B. Description: Manufactured assembly made of 6.0-lb/sq. ft., 0.0938-inch-thick, lead flashing collar and skirt extending at least 10 inches from pipe, with galvanized-steel boot reinforcement and counterflashing fitting.**

1. Open-Top Vent Cap: Without cap.
2. Low-Silhouette Vent Cap: With vandal-proof vent cap.
3. Extended Vent Cap: With field-installed, vandal-proof vent cap.

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SANITARY WASTE PIPING SPECIALTIES**

**2.4 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES**

- A. Air-Gap Fittings:
1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
  2. Body: Bronze or cast iron.
  3. Inlet: Opening in top of body.
  4. Outlet: Larger than inlet.
  5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.
- B. Vent Caps:
1. Description: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
  2. Size: Same as connected stack vent or vent stack.

**2.5 FLASHING MATERIALS**

- A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:
1. General Use: 6-lb/sq. ft., 0.0938-inch thickness.
- B. Fasteners: Metal compatible with material and substrate being fastened.
- C. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.
- D. Solder: ASTM B 32, lead-free alloy.
- E. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Refer to Division 22 Section 22 05 22 "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.
- B. Install cleanouts in aboveground piping according to the following, unless otherwise indicated:
1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
  2. Locate at each change in direction of piping greater than 45 degrees.
  3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
- C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
1. Position floor drains for easy access and maintenance.

**SECTION 22 1319  
SANITARY WASTE PIPING SPECIALTIES**

2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
    - a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
    - b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
    - c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.
  3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
  4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
- F. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.
- G. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.
- H. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.
  1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
  2. Size: Same as floor drain inlet.
- I. Install air-gap fittings on draining indirect-waste piping discharge into sanitary drainage system.
- J. Install vent caps on each vent pipe passing through roof.
- K. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

**3.2 CONNECTIONS**

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment to allow service and maintenance.

**3.3 FLASHING INSTALLATION**

- A. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
  1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
  2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
- B. Set flashing on floors and roofs in solid coating of bituminous cement.
- C. Secure flashing into sleeve and specialty clamping ring or device.
- D. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Division 07 Section "Sheet Metal Flashing and Trim."
- E. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

**SECTION 22 1319  
SANITARY WASTE PIPING SPECIALTIES**

3.4 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION

NOT FOR BID

**SECTION 22 1323  
SANITARY WASTE INTERCEPTORS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Grease interceptors.
- B. RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 DEFINITIONS**

- A. FRP: Fiberglass-reinforced plastic.

**1.3 ACTION SUBMITTALS**

- A. Product Data: Include materials of fabrication, dimensions, rated capacities, retention capacities, operating characteristics, size and location of each pipe connection, furnished specialties, and accessories.
- B. Shop Drawings: For each type and size of interceptor indicated.
  - 1. Include materials of construction, dimensions, rated capacities, retention capacities, location, and size of each pipe connection, furnished specialties, and accessories.

**1.4 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Interceptors, drawn to scale, on which the following items are shown and coordinated with each other, based on input from Installers of the items involved:
  - 1. Interceptors.
  - 2. Piping connections. Include size, location, and elevation of each.
  - 3. Interface with underground structures and utility services.

**1.6 PROJECT CONDITIONS**

- A. Interruption of Existing Sewer Services: Do not interrupt services to facilities occupied by Owner or others unless permitted under the following conditions and

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SANITARY WASTE INTERCEPTORS**

then only after arranging to provide temporary sewer services according to requirements indicated:

1. Notify Owner's Representative no fewer than seven <7> days in advance of proposed interruption of service.
2. Do not proceed with interruption of sewer services without Owner's Representative written permission.

**PART 2 - PRODUCTS**

**2.1 GREASE INTERCEPTORS**

A. Grease Interceptors: Fiberglass, to be appropriately sized based on anticipated usage and flow rates to meet applicable sanitary sewer discharge limits, incl. municipal by-laws.

1. Include accessways, tanks, and piping or openings to retain grease and to permit wastewater flow.
2. PVC cement welded type socket ports, or straight pipe, fitted into interceptor walls for each pipe connection.
3. Accessway Extension Collar:
  - a. Fiberglass risers (EC2), 24-inch (610-mm).
4. Accessway Frames and Covers: Round cover with non-slip cover finish, gasketed and non-vented top design with "Proceptor" lettering cast into cover.
  - a. Cast Iron: AASHTO M306 Traffic load rated. 24 inch- (610-mm-) diameter cover with 0.25" (6-mm-) gasket. Two closed pick holes. Non-Bolted or Bolted option. Weight 249 lbs. ASTM A48 CL35B.
  - b. Fiberglass: Pedestrian loading 24" diameter bolted and gasketed.
5. Watertight Flexible Caulking: Sikaflex 255 or Sikaflex 221 or approved alternate to provide watertight seal at extension collar joints.

B. Capacities and Characteristics:

1. Number of Compartments: 2 cells

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2. Grease Retention Capacity: 750 Gal
3. Solids Retention Capacity: -
4. Inlet and Outlet Pipe Size: 4"
5. Vent Pipe Size: 3"
6. Installation Position: Underground with accessway collar riser to grade.

**2.2 FIBERGLASS ACCESSWAY RISERS**

- A. Fiberglass accessway extensions: Fiberglass wound pipe.
  1. Length: From top of underground tank to underside of access frame at grade.
  2. Extension Sections: 0.25-inch (6-mm) minimum thickness and [24-inch (610-mm)] diameter as single continuous piece, without joints unless approved by the manufacturer.
    - a. Sealant: Watertight Flexible Caulking, Sikaflex 255 or Sikaflex 221 or approved alternate to provide watertight seal at extension collar joining to tank on bottom and access frame at top.

**PART 3 - EXECUTION**

**3.1 EARTHWORK**

- A. Excavating and trenching and backfilling are to meet local Building Code.
- B. Backfill per Green Turtle Installation Instructions. Pea gravel is preferred backfill material.

**3.2 INSTALLATION**

- A. Install fiberglass interceptors according to manufacturer's installation instructions.

**3.3 CONNECTIONS**

**SECTION 22 1323  
SANITARY WASTE INTERCEPTORS**

- A. Piping installation requirements are to meet local code for Sanitary Waste and Vent Piping. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Make piping connections between interceptors and piping systems.

END OF SECTION

NOT FOR BID

**SECTION 22 4000  
PLUMBING FIXTURES AND EQUIPMENT**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Water closets.
  - 2. Lavatories.
  - 3. Urinals.
  - 4. Protective shielding guards.
  
- B. Related Documents: The Contract Documents, as defined in Section 01 1000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
  
- C. Related Sections:
  - 1. Section 07 9200 - Joint Sealants: Seal fixtures to walls and floors.
  - 2. Section 22 0500 - Plumbing

**1.2 REFERENCES**

- A. American Society of Mechanical Engineers (ASME):
  - 1. ASME A112.18.1 - Finished and Rough Brass Plumbing Fixture Fittings.

**1.3 SUBMITTALS**

- A. Section 01 6000 – Product Requirements, Product Data, and Samples: Procedures for submittals.
  - 1. Product Data:
    - a. Product Data: Provide catalogue illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
    - b. Provide submittals for all fixtures and equipment, and all associated trim and hardware.
  
- B. Section 01 7704 – Closeout Procedures and Training: Procedures for closeout submittals.
  - 1. Project Record Documents: Accurately record the following:
    - a. Operation and Maintenance Data: Include fixture trim exploded view and replacement parts lists.

**SECTION 22 4000  
PLUMBING FIXTURES AND EQUIPMENT**

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 6000 – Product Requirements: Transport, handle, store, and protect Products.
- B. Only accept fixtures on site in factory packaging. Inspect for damage.
- C. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
  - 1. Floor Drain:
    - a. J. R. Smith.
    - b. Zurn.
    - c. Or approved equal.
  - 2. Lavatory:
    - a. American Standard.
    - b. Kohler.
    - c. Or approved equal.
  - 3. Stainless Steel Sink:
    - a. Elkay.
    - b. Just.
    - c. American Standard
    - d. Or approved equal.
  - 4. Water closets:
    - a. American Standard.
    - b. Kohler.
    - c. Or approved equal.
  - 5. Faucet (for Lavatory, Kitchen Sink, Mop Sink):
    - a. Chicago Faucet.
    - b. American Standard.
    - c. Or approved equal.
  - 6. Flush Valve:
    - a. American Standard.
    - b. Kohler.
    - c. Or approved equal.
- B. Furnish and install Products as indicated in Drawings.

**SECTION 22 4000  
PLUMBING FIXTURES AND EQUIPMENT**

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Section 01 7000 - Execution and Closeout Requirements: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
  - 1. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
  - 2. Verify that electric power is available and of the correct characteristics.
- C. Report in writing to the Engineer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected and approved by the Engineer.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the County.

**3.2 PREPARATION**

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

**3.3 INSTALLATION**

- A. Plumbing Fixtures:
  - 1. Install in accordance with manufacturer's instructions.
  - 2. Install each fixture with trap, easily removable for servicing and cleaning.
  - 3. Provide chrome plated rigid or flexible supplies to fixtures with screwdriver stops, reducers, and escutcheons.
  - 4. Install components level and plumb.
  - 5. Install and secure fixtures in place with wall carriers and bolts.
  - 6. Seal fixtures to wall and floor surfaces with sealant.
  - 7. Water Closets, Urinals and Lavatories: Provide adjustable cast iron fixture supports for all wall hung water closets, except where single vertical carriers in shallow walls occur.
  - 8. The use of lead-containing solder for plumbing and plumbing fixtures is prohibited in the construction of this project.
- B. Trap Primers
  - 1. Install primers under sinks and/or lavatories, and behind access panels out of line of sight. Provide access panels

**SECTION 22 4000  
PLUMBING FIXTURES AND EQUIPMENT**

2. Trap primers to have approval of plumbing and drainage institute.
3. Install trap primers in accordance with manufacturer's recommendations.

C. Backflow Preventers

1. Install in accordance with manufacturer's recommendations.
2. Pipe relief through fixed air gap and discharge to sewer.
3. Install adjacent to wall and/or floor utilizing stand-off brackets, angle frame, and/or concrete piers.
4. Test unit for leaks and pressure drop. Clean and/or replace soiled strainer media.

D. Protective Shielding Guards

1. Manufactured, plastic enclosure for covering hot- and cold-water supplies, trap and drain piping, and complying with ADA requirements and meeting ANSI code for barrier-free design. Provide at all accessible sinks and lavatories.

3.4 ADJUSTING

- A. Refer to Specification Section 01 7000 – Execution and Closeout Requirements.
- B. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.5 CLEANING

- A. At completion clean plumbing fixtures and equipment.

3.6 FIELD QUALITY CONTROL

- A. Section 01 4000 - Quality Requirements: Field testing and inspection.

Payment for items of work covered under Division 22 of the plans and these specifications shall be based on the lump sum bid pricing identified in the Bid Schedule. No additional compensation will be allowed.

**END OF SECTION**

SECTION 23 3400  
VENTILATION EXHAUST FANS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Ventilation Exhaust Fans
  - 1. Ceiling Cabinet Fans (Loren Cook Series GC or approved equal)

1.2 REFERENCES

- A. Home Ventilating Institute (HVI).
- B. Environmental Protection Agency (EPA): Energy Star program.
- C. Underwriters Laboratories (UL):
  - 1. UL Listed.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01 3300 - Submittal Procedures.
- 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. Verification Samples: Two representative units of each type, size, pattern, and color.
- D. Shop Drawings: Include details of materials, construction, and finish. Include relationship with adjacent construction.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum of five years documented experience.
- B. Installer Qualifications: Company specializing in performing Work of this section.
- C. 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 scheduled commencement of the Work. Attendees shall include Architect, Contractor and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.
- B. Protect from damage due to weather, excessive temperature, and construction operations.

SECTION 23 3400  
VENTILATION EXHAUST FANS

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.8 WARRANTY

- A. Manufacturer's standard limited warranty unless indicated otherwise.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Loren Cook Company of Springfield, Missouri.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 6000 - Product Requirements.

2.2 VENTILATION FANS

- A. Basis of Design:
  - 1. Model: Gemini GC Series Loren Cook
  - 2. Approved Equal
- B. Description:
  - 1. Fan shall be ceiling, wall, or inline mounted, direct driven, centrifugal exhaust fan.
  - 2. Shipping Weight: 25 Lbs.

2.3 CERTIFICATION

- A. Fan shall be manufactured by an ISO 9001 certified company. Fan shall be listed by Underwriters Laboratories (UL 705) and UL listed for Canada (cUL 705). Fan shall bear the AMCA Certified Ratings Seal for Sound and Air Performance.

2.4 CONSTRUCTION

- A. Fan housing shall be minimum 20-gauge galvanized steel and acoustically insulated. Blower and motor assembly shall be mounted to a minimum 14-gauge reinforcing channel and shall be easily removable from the housing. Motor shall be mounted on vibration isolators. Units shall be supplied with integral wiring boxes and disconnect receptacle shall be standard. Discharge position shall be convertible from right angle to straight through by moving interchangeable panels. The outlet duct collar shall include a reinforced aluminum damper with continuous aluminum hinge rod and nylon bushings. To accommodate different ceiling thickness, an adjustable pre-punched mounting bracket shall be provided. A white, non-yellowing, high impact styrene injection molded grille shall be provided as standard on 200 and 300 series. A powder painted white steel grille shall be provided as standard in the 400 - 900 series. Unit shall be shipped in ISTA Certified Transit Tested Packaging.

2.5 WHEEL

SECTION 23 3400  
VENTILATION EXHAUST FANS

- A. Wheel shall be centrifugal forward curved type, constructed of galvanized steel. Wheel shall be balanced in accordance with AMCA Standard 204-05, Balance Quality and Vibration Levels for Fans.

2.6 MOTOR

- A. Motor shall be permanent split capacitor with permanently lubricated sealed bearings, built-in thermal overload protection and disconnect plug. Motor shall be furnished at the specified voltage.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly constructed and prepared.
- 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.
- B. Install in a complete and finished manner in a craftsman-like way.

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 CLEANING AND PROTECTION

- A. Clean products in accordance with the manufacturer's recommendations.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

**SECTION 26 0500  
COMMON WORK RESULTS FOR ELECTRICAL**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Basic electrical methods.
  - 2. Grounding and bonding.
  - 3. Electrical identification.
  - 4. Electrical system testing and inspection.
  
- B. Related Documents: Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

**1.2 REFERENCES**

- A. National Electrical Contractors Association (NECA):
  - 1. NECA SI - Standard of Installation.
  
- B. National Electrical Manufacturers Association (NEMA):
  - 1. NEMA KS 1 - Enclosed Switches.
  
- C. National Electrical Testing Association (NETA):
  - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
  
- D. National Fire Protection Association (NFPA):
  - 1. NFPA 70 - National Electrical Code.

**1.3 SUBMITTALS**

- A. Submittal Procedures: Procedures for submittals.
  - 1. Product Data:
    - a. Grounding connections.
  - 2. Assurance/Control Submittals:
    - a. Electrical System Test Reports: Submit report including the following directly to Project Manager from Testing Laboratory, with copy to Contractor.
      - 1) Summary of project.
      - 2) Description of equipment tested.
      - 3) Description of test.
      - 4) Test results.
      - 5) Conclusions and recommendations.
      - 6) Appendix, including appropriate test forms.
      - 7) List of test equipment used and calibration date.
      - 8) Signature of responsible Testing Laboratory Officer.
    - b. Certificates: Manufacturer's certificate that each Product specified meet or exceed specified requirements.
    - c. Qualification Documentation: Submit documentation of experience indication compliance with specified qualification requirements.
  
- B. Closeout Submittals: Procedures for closeout submittals.

**SECTION 26 0500  
COMMON WORK RESULTS FOR ELECTRICAL**

1. Project Record Documents: Accurately record the following.
  - a. Locations of components.

**1.4 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing Work of this Section with minimum 5 years documented experience.
- B. Regulatory Requirements:
  1. Conform to requirements of NFPA 70.
  2. Products: Listed and classified by Underwriters Laboratories, Incorporated as suitable for the purpose specified and indicated.

**1.5 BASIC ELECTRICAL METHODS**

- A. Drawings are schematic and diagrammatic. Use judgment and care to install electrical Work to function properly and fit within building construction and finishes. Electrical conductors, conduit, components, not shown or specified, which are required for any device or system to produce a complete and operative system are required to be furnished and installed.
- B. Exact location of outlets is determined from dimension on Drawings, manufacturer's shop drawings, or as may be determined at Project Site. Do not scale Drawings for exact location of any item. Verify item mounting heights as required by project conditions prior to rough-in.
- C. Route conduits and wiring associated with new equipment and systems above ceilings, in existing chases, and concealed within building structure.
- D. Surface mounted raceways or conduit permitted only at locations indicated on Drawings.
- E. Circuit grouping, conduit or cable runs, and home runs are indicated with number of conductors shown in each raceway to clarify operation and function of various systems. Provide proper number of conductors and conduits or cables to provide operative system as indicated on Contract Documents. Do not regroup any feeder circuits, branch circuits, home runs, and zone alarms at any point, from that shown on Contract Documents.
- F. Branch and home run circuits are indicated as 2, 3, or 4 wire circuits unless otherwise noted. Do not connect two ungrounded conductors to same circuit breaker/fused switch in any panel. Circuit runs consist of a maximum of five conductors; 3 phase conductors, 1 neutral conductor, and 1 equipment ground conductor, unless otherwise noted. Do not splice branch circuit conductors in any panels, safety switches, or non-automatic circuit breakers in separate enclosures.
- G. New equipment, switches, devices, shown mounted on and/or adjacent to equipment, which if installed, would impair proper operation of existing or new equipment, shall be removed and relocated by Contractor as required so equipment will function properly. Notify Project Manager immediately if any such condition exists.
- H. Seal and make permanently watertight penetrations by electrical raceways or equipment through ceilings, walls, or floors.
  1. Seal penetrations in non-fire rated ceilings, walls, or floors material.
  2. Seal penetrations in fire rated walls with material.
- I. Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where

**SECTION 26 0500  
COMMON WORK RESULTS FOR ELECTRICAL**

manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A, and NFPA 70.

- J. Install equipment and materials to provide required maintenance and code working clearance for servicing and maintenance. Coordinate final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow required space for removal of parts that require replacement or servicing.
- K. Remove existing equipment, lighting fixtures, switches, and receptacles as required to facilitate new installation. Remove existing wiring and conduit serving items to be removed. Conduit in inaccessible areas shall be cut off below finished surfaces and existing surface patched to match existing. Provide blank plates on existing flush mounted outlet boxes that will be abandoned. Remove all abandoned conductors from raceways.

**PART 2 - PRODUCTS**

**2.1 ELECTRICAL IDENTIFICATION**

- A. Nameplates:
  - 1. Engraved three-layer laminated phenolic plastic, white letters on black background.
  - 2. Locations:
    - a. Each electrical distribution and control equipment enclosure.
    - b. Communication cabinets.
    - c. Terminal Cabinets.
    - d. Separately enclosed circuit breakers.
    - e. Panelboards
    - f. Pull boxes.
    - g. Switches and disconnects.
  - 3. Letter Size:
    - a. Use 1/8-inch letters for identifying individual equipment and loads.
    - b. Use 1/4-inch letters for identifying grouped equipment and loads.
- B. Wire and Cable Markers:
  - 1. Description: Cloth tape or tubing type wire markers.
  - 2. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.
  - 3. Legend:
    - a. Power Circuits: Branch circuit or feeder number indicated on Drawings.
    - b. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on Drawings.
- C. Conduit Markers:
  - 1. Location: Furnish markers for each conduit longer than 10 feet.
  - 2. Spacing: 20 feet.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Execution Requirements: Verification of existing conditions before starting work.

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COMMON WORK RESULTS FOR ELECTRICAL**

- B. Verification of Conditions: Verify that field measurements, surfaces, substrates, and conditions are as required, and ready to receive Work.
- C. Report in writing to Project Manager prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the County.

**3.2 INSTALLATION - GROUNDING AND BONDING**

- A. Provide bonding and grounding in conformance with NFPA 70.
- B. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
- C. Testing and Inspection:
  - 1. Inspect and test in accordance with NETA ATS, except Section 4.
  - 2. Perform inspections and tests listed in NETA ATS, Section 7.13.

**3.3 INSTALLATION - ELECTRICAL IDENTIFICATION**

- A. Install nameplate parallel to equipment lines.
- B. Secure nameplate to equipment front using stainless steel screws. Use minimum two screws at each end of nameplate.
- C. Secure nameplate to outside surface of door on panelboards and switchboards.

**3.4 FIELD QUALITY CONTROL - ELECTRICAL TESTING AND INSPECTION**

- A. Conduct testing to Determine that Electrical Equipment and Systems:
  - 1. Are in conformance with Contract Documents and applicable reference standards.
  - 2. Is professionally installed without damage due either to installation or shipment.
  - 3. Operate correctly, meet design intent, and are performing at optimum level, in safe manner.
- B. Provide a complete written record of operational values to be used as a baseline for future operational testing.
- C. Instrumentation:
  - 1. Provide calibration program that assures applicable test instrumentation is maintained within rated accuracy and directly traceable to National Bureau of Standards.
  - 2. Calibrate instruments in accordance with following frequency schedule:
    - a. Field Instruments:
      - 1) Analog - 6 months maximum.
      - 2) Digital - 12 months maximum.
    - b. Leased Specialty Equipment: 12 months. (Where accuracy is guaranteed by lessor.)
  - 3. Dated Calibration Labels: Visible on test equipment.
  - 4. Keep records current; show date and result of instruments calibrated or tested.

**SECTION 26 0500  
COMMON WORK RESULTS FOR ELECTRICAL**

5. Maintain current instrument calibration instruction and procedure for each test instrument.
  6. Calibrating Standard: Higher accuracy than that of instrument being calibrated.
- D. Regulatory Requirements:
1. Safety Practices: Include, but not limited to, the following requirements:
    - a. Occupational Safety and Health Act of 1970 - OSHA.
    - b. Accident Prevention Manual for Industrial Operations, Seventh Edition, National Safety Council, Chapter 4.
    - c. Applicable State and Local Safety Operating Procedures.
    - d. NETA Safety/Accident Prevention Program.
    - e. NFPA 70E - Electrical Safety Requirements for Employee Workplace.
    - f. American National Standards for Personnel Protection, ANSI Z244.1.
  2. Perform tests with apparatus de-energized except where otherwise specifically required herein.
  3. Testing Laboratory: Provide a designated safety representative present at Project Site and supervise safety operations.
  4. Power Circuits: Conductors shorted to ground by a hot line grounded device approved for the purpose.
  5. Do not proceed until safety representative has determined that it is safe to do so.
  6. Testing Laboratory: Provide sufficient protective barriers and warning signs to conduct specified tests safely.
- E. Tests and inspections include, but are not limited to the following:
1. Proper operation of equipment.
  2. Continuity of raceway system.
  3. Insulation leakage and impedances.
  4. Ground system resistance.
  5. Sub-system tests indicated in other Sections.
- F. Load balance all electrical phases, at device, panels, and switchboards.
- G. Perform electrical system testing and inspection as specified in each Division 16 Section and as specified in this Section.

**END OF SECTION**

**SECTION 26 0503  
EQUIPMENT WIRING CONNECTIONS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section includes electrical connections to equipment.
- B. Related Sections: 26 0500 Common Work Results for Electrical

**1.2 REFERENCES**

- A. National Electrical Manufacturers Association:
  - 1. NEMA WD 1 - General Requirements for Wiring Devices.
  - 2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

**1.3 SUBMITTALS**

- A. Section 01 3300 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit wiring device manufacturer's catalog information showing dimensions, configurations, and construction.
- C. Manufacturer's installation instructions.

**1.4 CLOSEOUT SUBMITTALS**

- A. Section 01 7800 - Closeout Submittals.
- B. Project Record Documents: Record actual locations, sizes, and configurations of equipment connections.

**1.5 COORDINATION**

- A. Division 1 - Alteration Project Procedures.
- B. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
- C. Determine connection locations and requirements.
- D. Sequence rough-in of electrical connections to coordinate with installation of equipment.

**SECTION 26 0503**  
**EQUIPMENT WIRING CONNECTIONS**

- E. Sequence electrical connections to coordinate with start-up of equipment.

**PART 2 - PRODUCTS**

**2.1 CORD AND PLUGS**

- A. Manufacturers:
  - 1. Carol.
  - 2. Hubbell.
  - 3. Substitutions: Division 1 - Product Requirements. Not Permitted.
- B. Attachment Plug Construction: Conform to NEMA WD 1.
- C. Configuration: NEMA WD 6; match receptacle configuration at outlet furnished for equipment.
- D. Cord Construction: Type SO multi-conductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
- E. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Division 1 - Administrative Requirements: Coordination and project conditions.
- B. Verify equipment is ready for electrical connection, for wiring, and to be energized.

**3.2 EXISTING WORK**

- A. Remove exposed abandoned equipment wiring connections, including abandoned connections above accessible ceiling finishes.
- B. Disconnect abandoned utilization equipment and remove wiring connections. Remove abandoned components when connected raceway is abandoned and removed. Install blank cover for abandoned boxes and enclosures not removed.

**SECTION 26 0503**  
**EQUIPMENT WIRING CONNECTIONS**

- C. Extend existing equipment connections using materials and methods as specified.

**3.3 INSTALLATION**

- A. Make electrical connections.
- B. Make conduit connections to equipment using flexible conduit. Use liquid tight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Install receptacle outlet to accommodate connection with attachment plug.
- E. Install cord and cap for field-supplied attachment plug.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

**3.4 ADJUSTING**

- A. Section 01 7800 – Closeout Submittals
- B. Cooperate with utilization equipment installers and field service personnel during checkout and starting of equipment to allow testing and balancing and other startup operations. Provide personnel to operate electrical system and checkout wiring connection components and configurations.

END OF SECTION

**SECTION 26 0513  
BASIC ELECTRICAL MATERIALS AND METHODS**

**PART 1 GENERAL**

**SUMMARY:** Furnish materials and perform labor required to execute this work indicated on the drawings, as specified, and as necessary to complete the Contract, including, but not limited to, these major items:

- A. Examine all other sections for work related to those other sections and required to be included as work under this section.
- B. Make arrangements with the Power and Telephone Companies for services of power and telephone systems, and pay all fees and charges levied by them. Notify utility companies when work under this section commences.
- C. Provide and complete underground conduit connecting the new emergency generator system up to the emergency panel including conduits, cables, concrete encasement, grounding, and metering facilities as specified.
- D. Provide new emergency panelboard 120/208v, 42-circuits including feeders, branch circuits and all respective devices. Verify with the Serving Utility for the available fault current. Fault current on the new emergency panel shall be fully rated.
- E. Telephone service, including conduits, backboards and grounding per Telephone Co.'s requirements.
- F. Cable Television service, including conduits, cabinets, cabling and grounding as required by Cable Television Company.
- G. Obtain all permits required from all agencies and plan for all inspections required.
- H. Complete power and lighting branch circuit wiring including junction boxes, pull boxes, outlet boxes, devices, cable supports, grounding equipment, materials, and equipment for a complete installation.
- I. Lighting fixtures and lamps in fixtures see lighting fixtures schedule on drawings.
- J. Complete line and low voltage wiring and connections of HVAC and plumbing equipment. Provide gutters, disconnect switches, fuses, relays, time switches, and all auxiliaries.
- K. Power panelboards, transfer switches, feeders, conduit, pull boxes and all auxiliaries.
- L. Minimum of 5" concrete housekeeping pad shall be required on the emergency generator system including the grounding system.
- M. Wiring and connections to all electrically operated equipment and appliances as shown on the drawings.
- N. Excavation, backfill, repaving and concrete work to complete the work under this Section.
- O. Special grounding system complete, including ground rods, ground bars, cables, and miscellaneous hardware.
- P. Bakelite nameplates.

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**BASIC ELECTRICAL MATERIALS AND METHODS**

- Q. Temporary electrical service as needed for all trades during construction of project.
- R. Conduit, with cables, for the Cable TV system as indicated, including boxes, cabinets, and miscellaneous hardware and finish plates.
- S. Power for Smoke and Fire Detection System complete, including conduit, wiring, outlets, fittings, and devices.
- T. Fire Alarm system complete with control panel, annunciator and including conduit, detectors, devices as indicated and required, wiring, outlets, fittings.
- U. Construction permits.
- V. Record and "as-built" drawings.
- W. Certificates and warranties.
- X. Owner manuals.
- Y. Perform all other work necessary for the complete installation of all electrical work as herein specified. Refer to the approved electrical plan set for details.

**PART 2 - MATERIALS**

**2.1 CONDUIT AND RACEWAYS**

- A. All shall be provided with fittings and accessories approved for purpose and equal in all respects to raceway.
- B. Rigid steel conduit shall be hot-dipped galvanized and comply with U.S. Standard UL6 and ANSI Standard C80.1.
- C. Intermediate steel conduit shall be hot-dipped galvanized and comply with U.S. Standard 1242.
- D. Electrical metallic tubing (EMT) shall be galvanized on the outside and coated on the inside with a hard-smooth lacquer finish. EMT fittings shall be steel compression gland. EMT shall comply with U.L. 797 and ANSI C80-3.
- E. Flexible metallic conduit shall be galvanized steel with steel fittings. Liquid and moisture tight conduit shall be American Brass with Appleton "ST" connectors or acceptable equal. Flexible conduit shall be only used in concealed areas in walls for connection to recessed light fixtures, motors, and transformers.
- F. Plastic conduit shall be polyvinyl chloride (PVC) Schedule 40 for direct burial or Type I for concrete encased, for use with 90°C. Conduits as manufactured by Carlon, Kraylon, Borg Wagner, Stauffer, Triangle or acceptable equal.
- G. Surface metal raceway shall be Wiremold or Walker-Parkersburg. Raceways and fittings shall be of one manufacturer and designed for use together.
- H. Wireways shall be hinged cover or screw cover complete with all necessary manufactured fittings which shall be of one manufacturer. Wireway shall be Square D square duct or approved equal by G.E., ITE.

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1. Plastic-coated conduit shall be rigid galvanized steel conduit having a 0.030" minimum thick factory-bonded PVC jacket, using pre-jacketed couplings as manufactured by Pittsburgh Robroy, Plastic Applicator, Occidental or approved equal.

**2.2 WIRE AND CABLES**

- A. All shall be new. All conductors #8 AWG and larger, shall be stranded. Color code all conductors as specified and as prescribed by NEC unless specified otherwise.
- B. Secondary voltage (600 volt or below) cables and wires shall be copper, unless otherwise indicated on drawings, single conductor rated 600 volts conforming to or exceeding IPCEA Specifications and shall be as follows:
  1. In sizes #1/0 AWG to 4/0: Cross-linked polyethylene insulation type XHHW (75 - 90°) or THWN.
  2. In sizes 250 MCM and larger: Type RHW/USE or THWN.
  3. In sizes #1 AWG and smaller: All conductors shall have heat/moisture resistant thermoplastic insulation type THW or THWN (75°C), except as follows:
    - a. Where conduit temperature will exceed 100°F, use type THHN (90°C). Type XHHW (90°C) permissible in dry locations.
    - b. In 120-volt incandescent fixtures, type AF (150°C).
    - c. In wireways of fluorescent lighting fixtures types THW-MTW (90°C).
    - d. Handling cord drops and cord connections: Type "SO" cord.
  4. Grounding Conductors: Copper Type TW with green integrally-colored insulation of bare-medium-hard-drawn copper.
  5. General Electric, Okonite, Rome or General Cable products are acceptable.
  6. Low Voltage Conductors: Jacketed, approved type, with low smoke producing characteristics.

**2.3 WIRING DEVICES**

- A. Wall (Local) Switches: Totally enclosed, AC rated, silent type ivory finish or other finishes on dark colored walls as selected by the Owner. Switches on emergency circuits shall be red. All switch mounting straps shall be metal and offer self-grounding or be equipped with a green, hex-head ground screw. Numbers used below are those of Hubbell. Equivalent Leviton, Arrow-Hart, Bryant, P & S, Sierra or G.E. are acceptable.

(1) Single-Pole Switches	#RSD115I	15 amps	120 volts
(2) Single-Pole Combination	#RCD101I	15amps	120 volts
(3) Single-Pole Combination	#RCD111I	15amps	120 volts
Three-Way Switches	#RSD315I	15 amps	120 volts

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- B. Occupancy sensor switch shall be Hubbell RMS140I passive infrared sensor or equal by Leviton or Arrow Hart.
- C. Receptacles:
1. Duplex receptacles shall be specification grade, Tamper resistance, NEMA 5-20R configuration. They shall be capable of being side or back wired, with clamp type terminals for back wiring and have a metal mounting strap with self-grounding and a green, hex-head grounding termination screw. The grounding blades shall be aligned in such a manner that they are parallel to the longitudinal plane of the receptacle. Numbers used below are those of Hubbell. Equivalent Leviton, Arrow-Hart, Bryant, P&S, Sierra, or GE are acceptable.

Duplex	20A	White color	#BR20ITR
GFI Duplex	20A	White color	#GF20IL
Single Receptacle:			# RR2011
  2. All receptacles shall have ivory finish.
  3. Receptacles on emergency circuits shall be red, except for isolated ground receptacles on emergency circuits, which shall be orange with red cover plates.
- D. Device Cover Plates: matching device cover plates by Hubbell, Smooth nylon with Ivory finish unless otherwise selected by the Owner. Outlets in mechanical/electrical/utility rooms, and garage shall have stamped steel cover plates. Color of device plates shall be coordinated with the Owner. Red plates for receptacles on emergency circuits. Weatherproof cover: Hubbell # HBL5221
- E. Telephone or Data Jacks: shall be RJ45 jacks with Hubbell frame and multimedia ivory face plate.
- F. Television outlet jacks shall be recessed gold "F" connector Hubbell SFGRFEI with Hubbell frame and multimedia ivory face plate.
- G. Special Purpose Receptacles: Provide where shown on drawings. Specification grade, standard color, and of the appropriate code and NEMA configuration to match the supply circuit and load involved. Provide proper grounding through receptacle for equipment.

**2.4 OUTLET BOXES, JUNCTION BOXES AND PULL BOXES**

- A. Outlet Boxes: Hot-dipped galvanized or sherardized of required size, 4" sq. minimum or octagonal and of depth required for flush mounted devices and lighting fixtures. Cast-type with gasketed covers for surface-mounted devices. All outlets for exterior application shall be cast, weatherproof type with gasket and cast cover plate.
- B. Junction and Pull Boxes: Use outlet boxes as junction boxes wherever possible. Larger junction and pull boxes over 12" in any dimension shall be fabricated from sheet steel, sized according to code, and have screw-on covers. All junction boxes shall be accessible.

**2.5 WIRE CONNECTORS**

- A. For wires size #10 AWG and smaller, use Scotchlok or Ideal insulated pressure type (with live spring) rated 105°C, 600 volts, for building wiring and 1000 volt in signs or fixtures.

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- B. For wires size #8 AWG and larger, T & B or equivalent compression type with 3M #33 tape insulation.

2.6 CONDUIT HANGERS

- A. Galvanized steel with special accessories for purpose and adequate to support load imposed. Support individual conduit 1-1/2" and larger and all multiple conduit runs with hangers. Clamp conduits individually to each support.

2.7 SUPPORTS AND HANGERS

- A. Wall brackets and ceiling trapeze hangers shall be Binkley, Elcen, Kindorf, Multi-Frame, Power Strut, or Unistrut.
- B. All lighting fixtures and conduits shall be fully braced as required by State of California Seismic Regulation. Contractor shall be responsible for bracing design. Provide State of California Registered Structural Engineer's approval as part of this contract for all electrical equipment installation.

2.8 FUSES AND CABINET

- A. Fuses: Shall be Class K-1 and K-5 of rejection type for 600 amperes and below and Class L for over 600 amperes. Fuses shall be Bussman "Limitron" and "Fusetron."
- B. Fuse Cabinet:
  - 1. Surface-mounted steel fuse cabinets shall have a hinged front door and a flush catch with lock (panelboard type). Each cabinet shall contain 3 spare fuses of each size and type used in associated switchgear and safety switches. On front of hinged door, provide an engraved nameplate with black-white phenolic material screwed in place reading: "SPARE FUSES".
  - 2. On inside of door provide the following information typewritten and covered with clear plastic: "Use these spare current-limiting fuses to replace any fuses of the current-limiting type that have blown. Replace fuses with ones of similar rating-- DO NOT INCREASE FUSE RATING.
  - 3. In a separate paragraph state name, address, and telephone number of at least 2 distributors located within 80 miles of project who stock current-limiting fuses. Indicate date (month and year) in bottom right-hand corner.

2.9 CONDUIT SEALS

- A. Conduit passing through concrete walls shall be sealed with Chase-Foam CTCPR-855. Match fire rating of walls.

PART 3 - EXECUTION

3.01 GENERAL

- A. Electrical system layouts indicated on drawings are generally diagrammatic, but shall be followed as closely as actual construction and work of other trades will permit. Govern exact routing of raceways and locations of outlets by structure and equipment served. Take all dimensions from architectural drawings.

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- B. Consult all other drawings. Verify all scales and report any dimensional discrepancies or other conflicts to the Architect and Engineer before submitting bid.
- C. All home runs to panelboards are indicated as starting from outlet nearest panel and continuing in general direction of that panel. Continue such circuits to panel as though routes were completely indicated.
- D. Avoid cutting and boring holes through or structural members wherever possible. Obtain prior approval of the Architect and Engineer, and conform to all structural requirements when cutting or boring structure is necessary and permitted.
- E. Furnish and install all necessary hardware, hangers, blocking, brackets, bracing, runners, etc. required for equipment specified under this Section.

3.02 SLEEVES

- A. Where raceways pass through concrete construction, install sleeves accurately set in place.
- B. Have a man present during the pouring of concrete to make sure the location of sleeves is not disturbed during the pour.
- C. Cut all openings for which sleeves are omitted with rotary type drill, or other method as approved by the Architect and Engineer. Holes cut with pneumatic hammer will not be accepted.
- D. All sleeves through concrete floors shall be pipe sleeves with the top of sleeves a minimum of 1/2" above finished floor surfaces. Do not utilize more than one sleeve per pipe. Blockouts for multiple pipes or individual pipes will not be allowed.

3.03 RACEWAY INSTALLATION

- A. Above grade - defined as areas above finished grade for a building exterior and above top surface of any slabs (or other concrete work on grade) for a building interior. Provide for waterproofing of all raceways, outlets, fittings, etc. which penetrate the roof to preserve the weatherproof integrity of the building. Installation of and materials for above-grade raceways shall conform with the following:
  - 1. General - Install all raceways concealed except at surface cabinets, for motor and equipment connections, in mechanical equipment rooms, and elsewhere as noted on the drawings. Install a minimum of 6" from flues, steam pipes or other heated pockets for water-flashing and counter-flashing or pitch pockets for waterproofing of all raceways, outlets, fittings, etc. which penetrate roof. Route exposed raceways parallel or perpendicular to building lines with right angle turns and symmetrical bends. Raceways in concrete shall be run in a direct line, and where possible, with long sweep bends and offsets. Provide sleeves in forms for new concrete walls, floor slabs and partitions for passage of raceways. Waterproof all sleeved raceways. Minimum conduit size shall be 1/2".
    - a. Provide 5 empty 3/4-inch conduits for each flush-mounted panelboard into the accessible overhead ceiling space.
    - b. Provide raceway expansion joints with necessary bonding conductor at building expansion joints and where required to compensate for raceway or building thermal expansion and contraction. Terminate raceways 1-1/4" and larger with insulated bushing or rain-tight connections with insulated throats. Expansion/deflection fittings shall be OZ Gedney type AXDX or

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equal.

2. Rigid conduit or intermediate metallic steel conduit shall be installed in the following above-grade areas:
    - a. Embedded in above-grade concrete walls and floor slabs.
    - b. Where exposed to mechanical injury.
    - c. Where specifically required by the California Electrical Code.
  3. Electrical Metallic Tubing (EMT): May be installed in dry areas only in:
    - a. Concealed locations in furred or masonry walls or ceilings.
    - b. Embedded in poured insulating fills.
    - c. Exposed areas at least 8 feet above floor.  
EMT fittings shall be compression type (no die cast fittings allowed), except provide gland-nut type where embedded.
  4. Flexible sealtite metal conduit shall be only used for the following:
    - a. Makeup of motor, transformer, or equipment, and/or raceway connections where isolation of sound and vibration transmission is required. For connections in locations exposed to weather, or in interior locations subject to moisture, watertight flexible conduit shall be used.
    - b. Connections to recessed lighting fixtures shall not exceed 6 feet in length. Lengths of flexible metal conduit shall contain a separate grounding conductor as outlined under "Grounding" Section of this Specification. All conduit and fittings shall be steel.
  5. Surface raceways, where indicated on drawings, shall be metal and a size approved for number and size of wires to be installed and shall be installed in a neat, workmanlike manner, with runs parallel or perpendicular to walls and partitions. Raceways, elbows, fittings, outlets, and devices shall be of same manufacturer, and designed for use together.
  6. Wireways, where indicated, complete with elbows, tees, connectors, adapters, etc., with all parts factory fabricated and of same manufacturer. Communication cable wireway shall be approved for use in return plenum space.
    - a. Install communication cables in communication cable wireway.
- B. Below-Grade: Defined as area below finished grade for a building exterior and below bottom floor slab for a building interior.
1. General: All service and feeders below-grade shall be concrete encased. Below-grade raceways shall project 2" minimum above floor or equipment foundation. Install exterior underground conduits 36" minimum below finished grade. Do not penetrate waterproof membranes unless proper seals are provided. Conduits below building slab shall be 12" minimum below bottom of concrete. Make all penetrations through concrete with rigid plastic-coated conduit.
  2. Non-encased Raceways: Unless specifically noted on drawings for concrete encasement, provide either of the following raceway systems for installation below slabs on grade or in earth or gravel.
    - a. Rigid, heavy-wall, Schedule 40, polyvinyl chloride PVC plastic conduit, suitable for direct burial. All offsets and 90° ells shall be rigid plastic-coated conduit.
    - b. Rigid, galvanized steel conduit having a 0.30" minimum thickness, factory bonded (PVC Jacket), using pre-jacketed couplings to provide substantially watertight jacketing system.

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**3.04 OUTLETS**

- A. Exact location of outlets and equipment shall be governed by structural conditions and obstructions or other equipment items. When necessary, relocate outlets so that when fixtures or equipment are installed, they will be symmetrically located according to room layout and will not interfere with other work or equipment. Verify final location of all panels, equipment, etc. with the Architect. If dimensions are not given, locate outlets within +6" of location as scaled from drawings.
- B. Provide zinc-coated or cadmium-plated sheet steel outlet boxes not less than 4" octagonal or square, unless otherwise noted. Equip fixture outlet boxes with 3/8" no-bolt fixture studs. Where fixtures are mounted on or in an accessible type ceiling, provide a junction box and extend flexible conduit to each fixture. Outlet boxes in finished ceilings or walls shall be fitted with appropriate covers, set to come flush with the finished surface. Where more than one switch or device is located at one point, use gang boxes and covers unless otherwise indicated. Sectional switch boxes or utility boxes will not be permitted. Provide tile box or a 4" square box with tile ring in masonry walls which will not be plastered or furred, or where "drywall" type materials are applied.
- C. Back-to-back outlets in the same wall, or thru-wall type boxes not permitted. Provide 8" (minimum) long nipple to offset for all outlets shown on opposite sides of a common wall to minimize sound transmission.
- D. Surface-mounted devices are to be mounted in cast-type boxes with gasketed covers.
- E. Except as otherwise noted, locate outlets and panelboards as follows: Dimensions given are from finished floor to center line of outlets except panels. Adjust heights of outlets in masonry walls to correspond with consistent brick or block course. Outlets in block walls shall be installed in core of block.
  - 1. Wall switches 48"
  - 2. Convenience outlets, long axis vertical with grounding pole on bottom 15"
  - 3. Phone outlets 15"
  - 4. Panelboards (to top of trim) 6'-6"
  - 5. Fire alarm horns 7'-6"
  - 6. Fire alarm stations 3'-8"
  - 7. Clock outlets 84"
  - 8. Data outlets 15"
  - 9. Wall phone outlets 54"
- F. Over counters, benches, special equipment, baseboards, fin tube radiators, etc. or at wainscoting, outlets shall be at a height (6") to prevent interferences to service equipment, or as noted on drawings.

**3.05 JUNCTION AND PULL BOXES AND CABINETS**

- A. Construct junction or pull boxes not over 150 cubic inches in size as standard outlet boxes, and those over 150 cubic inches the same as "Cabinets", with screw covers of same gauge metal. Removable covers must be always accessible. Mount per "Outlets" Section.
- B. Provide a standard access panel having a hinged metal door neatly fitted into a flush metal trim, where a junction box or equipment is located above non-accessible ceilings or behind finished walls. Coordinate location and type with the Architect and Engineer.

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- C. All cabinets shall be set rigidly in place with fronts straight and plumb, center panelboard interiors in door openings.
- D. For ease of identification during maintenance and remodeling, junction box covers shall be color coded according to the following schedule:
  - 1. Fire Alarm - Red
  - 2. Emergency Circuitry - Yellow
  - 3. Telephone - Green
  - 4. Televisions - Violet
  - 5. Computer Data - Blue
  - 6. 277/480V Systems – Orange

3.06 INSTALLATION OF WIRES

- A. All wiring shall be routed through an acceptable raceway regardless of voltage application, unless specified otherwise under other Sections of these Specifications.
- B. Pull no wire into any portion of conduit system until all construction work which might damage the wire has been completed. Conductors for all voltages shall be color coded as follows:
  - 1. Wire No. 10 and smaller be factory color coded.
  - 2. Wire No. 8 and larger may be color coded by field color taping of the entire length of exposed end or 12" of exposed end, whichever is less.
  - 3. 120/240 volts: Phases: a-black, b-red, c-blue, neutral-white, ground-green
  - 4. Isolated ground: Green with a white stripe.
- C. Change branch circuit wire from #12 AWG to #10 where more than 3 current-carrying conductors are in one conduit.
- D. Sizes of conduits, unless specifically shown otherwise, shall be determined from the National Electrical Code.
- E. Install all wire continuous from outlet to outlet or terminal to terminal. Splices in cables when required shall be made in handholes, pull boxes, or junction boxes and shall be in strict accordance with cable manufacturer's recommendations utilizing solderless connectors UL approved for the use.
- F. Make up splices in outlet boxes with 8" of correctly color-coded tails left in box. Splices in wires size #8 AWG and smaller shall be made with insulated spring type wire connectors, "Scotchlok". Splices in larger wire and cables shall be made with indent connectors approved for the purpose. All insulating tape used on circuits of 600 volts and less shall be 3-M #33 or Plymouth Slipknot Grey.
- G. All cables and wires passing through manholes and handholes shall be full looped inside manhole and handhole and supported on galvanized steel racks with insulators.
- H. Make all ground, neutral and line connections to receptacle and wiring device terminals as recommended by Manufacturer. Provide ground jumper from outlet box to ground terminal of receptacle.
- I. Unless otherwise indicated, all wiring for branch circuits shall be #12 AWG protected by 20 ampere circuit breakers. If distance from panel to first outlet is 75 feet or greater (for 120-volt circuits) or 150 feet or greater (for 277-volt circuits) No. 10 shall be installed.

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- J. When two or three fluorescent lighting circuits share a common neutral, the neutral conductor shall be increased to the next larger wire size.

**3.07 SUPPORTS AND HANGERS**

- A. Support and align all raceways, cabinets, boxes, fixtures, etc. in an accepted manner and as herein specified. Support raceways on accepted types of wall brackets, specialty steel clips or hangers, ceiling trapeze hangers or malleable iron straps. Plumbers perforated straps not permitted. Do not suspend raceways or equipment from steam, water or other piping, or ductwork, except use of common supports such as Unistrut at roof level installed by General Contractor for this purpose. Provide toggle bolts or expansion (spider type) anchors in hollow masonry units, lead expansion shields in solid masonry or concrete (or preferably use pre-set concrete inserts in concrete), machine screws, bolts or welding on metal surfaces, and wood screws on wood construction. Note: Malleable nails of proper type may be used to anchor in wood construction in lieu of screws only where rigid support will be provided by their use. Use of power-driven studs is prohibited without express permission.
- B. Where suspended ceilings are 24" or less below structure (bar joints, concrete, etc.), provide independent support from structure for all raceways. Where a space of over 24" to suspended ceiling occurs, hangers may be utilized to support conduits of one inch or less trade size.
1. Mount all conduits a minimum of 7" above any accessible type ceiling, or with spacing as required to permit relocation of recessed fixtures to any location.
- C. Structural and post tensioned concrete members shall not be drilled or pierced without prior approval.
- D. Where outlets are installed in steel stud type systems, provide additional cross bracing, bridging and/or straps as required to make outlet completely rigid prior to application of wall facing material.
- E. Design hangers and wall brackets so that maximum deflection will be no greater than 1/8".

**3.08 EXCAVATION AND BACKFILL**

- A. All excavation and backfill required because of this work shall be included. Excavation of trenches shall be sequenced to minimize "open time" and inconvenience.
- B. Trenches shall be cut straight and true and shall be shored and braced where required. See other applicable divisions of the specifications - for specific methods and requirements.

**3.09 WIRING DEVICES**

- A. Install devices of type indicated on drawings. All connections shall be made up tight and device set plumb. Use care in installing device to prevent damage to device and wire in outlet box.
- B. Provide a device plate for each outlet to suit device installed and install blank plates or covers for conjunction boxes and empty outlets.

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3.10 OVERCURRENT PROTECTIVE DEVICES

- A. Install fuses where required as a protective device and in conformance with equipment manufacturer's specified requirements.

3.11 CONCRETE AND CONCRETE WORK

- A. Concrete shall conform to requirements of Division 3 Section 03 3000 in these Specifications.

3.12 MECHANICAL WIRING AND CONNECTIONS

- A. Work by Mechanical Contractor: Provide all motors and heating equipment included under Divisions 22 and 23. Furnish all control devices which directly handle the full load current of the motor or heating equipment. Provide all control wiring which does not directly control the full load motor or heating equipment current. Furnish identification signs for electrical components of mechanical system.
- B. Work by Electrical Contractor: Provide all power feeders and final connect to all motors and electric heating equipment furnished under Divisions 22 and 23. Install and wire through all control devices which directly handle full load motor or electric heating equipment current, such a magnetic starter, line voltage thermostats, P.E. switches, etc., which are furnished by mechanical contractor. Locate where shown on the mechanical drawings. Install identification signs furnished under Divisions 22 and 23. Provide 120V outlet and dedicated circuit for control voltage; locate in each mechanical equipment room or area. Provide disconnects for all mechanical equipment.

3.13 EQUIPMENT CONNECTIONS

- A. Provide all final connections for items of equipment including power feeders and disconnects or receptacles as required. All equipment items will be furnished and set by others. Confirm with suppliers all rough-in data such as electrical characteristics, dimensions, locations, type of connection, etc., prior to installation.

END OF SECTION

**SECTION 26 0519  
LOW VOLTAGE WIRES (600 VOLT AC)**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Provisions of Division 01 apply to this section.
- B. Section Includes: Low-voltage wire, splices, terminations and installation.

**1.2 SUBMITTALS**

- A. Provide in accordance with Division 01.

**PART 2 - PRODUCTS**

**2.1 WIRES**

- A. Wires shall be single conductor type THHN or THWN insulated with polyvinyl chloride and covered with a protective sheath of nylon, rated at 600 volts. Wires may be operated at 90 degrees C. maximum continuous conductor temperature in dry locations, and 75 degrees C. in wet locations and shall be listed by UL Standard 83 for thermoplastic insulated wires, listed by Underwriter's Laboratories (UL) for installation in accordance with Article 310 of the California Electrical Code (CEC). Conductors shall be solid copper for 12 AWG and smaller conductors, and stranded copper for 10 AWG and larger conductors. Conductors shall be insulated with PVC and sheathed with nylon. Wires shall be identified by surface markings indicating manufacturer's identification, conductor size and metal, voltage rating, UL symbol, type designations and optional rating. Indentations for lettering are not permitted. Wires shall be tested in accordance with the requirements of UL standard for types THWN, or THHN.
- B. Conductors shall be solid Class B or stranded Class C, annealed uncoated copper in accordance with UL standards, or another Nationally Recognized Testing Laboratory (NRTL).

**2.2 STANDARDS**

- A. THWN/THHN wires shall comply with the following standards:
  - 1. UL 83 for thermoplastic insulated wires.
  - 2. UL 1063 for machine tool wires and cables.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Wires shall not be installed until debris and moisture is removed from conduits, boxes, and cabinets. Wires stored at site shall be protected from physical damage until they are installed and walls are completed.
- B. Wire-pulling compounds furnished as lubricants for installation of conductors in raceways shall be compounds approved and listed by UL, NRTL, or equal. Oil, grease, graphite, or similar substances are not

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**LOW VOLTAGE WIRES (600 VOLT AC)**

permitted. Pulling of 2 AWG or larger conductors shall be performed with a cable pull machine. Any runs shorter than 50 feet are exempt. When pulling conductors, do not exceed manufacturer's recommended values

- C. The Project Inspector will observe installation of feeder cables. Notify the Project Inspector not less than two working days in advance of the proposed time of feeder installation.
- D. At outlets for light, power, and signal equipment, pigtail splices with 8-inch circuit conductor leads for connection to fixtures, equipment, and devices.
- E. Pressure cable connectors, pre-insulated 3M Scotchlok, Hubbell Power, O-Z/Gedney or equal, Y, R or B spring-loaded twist-on type, may be furnished in splicing number 8 AWG or smaller wires for wiring systems; except public address and telephone systems.
- F. Joints, splices, taps, and connections to switchboard neutral, bonding or grounding conductors, conductors to ground busses, and transformer connections for wires 6 gage and larger shall be performed with high-pressure cable connectors approved for installation with copper conductors. Connectors shall be insulated with heavy wall heat shrink WCSM, or cold-applied roll-on sleeve RVS. Insulation level shall be a minimum of 600V and joints, splices, and taps shall be qualified to ANSI C 119.1, UL, NRTL, or equal listed mechanical pressure connections.
- G. Connections to any bussing and high-pressure cable connectors shall be securely bolted together with corrosion-resistant plated carbon steel, minimum grade five machine screws secured with constant pressure-type locking devices.
- H. Connection of any bonding or grounding conductors shall be securely bolted together with corrosion-resistant plated carbon steel, minimum grade five machine screws secured with constant pressure-type locking devices.
- I. Wire switchboards, panel cabinets, pull boxes, and other cabinets except public address, shall be neatly grouped and tied in bundles with nylon ties at 10-inch intervals. In switchboards, panels and terminal blocks, wires shall be fanned out to terminals. If bundles are longer than 24 inches, a maximum of nine current carrying conductors may be bundled together.
- J. Install conductor lengths with a minimum length within the wiring space. Conductors must be long enough to reach the terminal location in a manner that avoids strain on the connecting lug.
- K. Maintain the conductor required bending radius.
- L. Neutral conductors larger than 6 gage, which are not color identified throughout their entire length, shall be taped, painted white or natural gray, or taped white where they appear in switchboards, cabinet, gutters or pull boxes. Neutral conductors 6 gage and smaller shall be white color identified throughout their entire length.

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**LOW VOLTAGE WIRES (600 VOLT AC)**

- M. Fire alarm and clock wiring shall be continuous from terminal cabinets or from equipment to each device. Splices are not permitted between devices and/or terminal cabinets at junction and pull boxes. Wiring shall be terminated at terminal blocks or devices only.
- N. Wiring systems shall be free from short circuits and grounds, other than required grounds. The contractor shall be responsible for the testing of feeder and branch circuit conductor's insulation resistance. The insulation of the conductors shall be tested prior to connections to any panelboards, switchboards, variable frequency drives, lighting control systems, ballasts, and wiring devices such as but not limited to GFI receptacles, TVSS receptacles, or equipment. Insulation testing of panelboards and switchboards shall be independently performed from the insulation testing of any conductors as specified in other sections of this specification.
1. Utilize the services of an approved independent testing laboratory to perform megger time-resistance insulation testing of feeder conductors. Tests must be conducted with wires disconnected at both ends.
    - a. Provide calibration program records to assure the testing instrument to be within rated accuracy. The test equipment accuracy shall be in accord with the requirements stated by the National Institute of Standards and Technology (NIST).
    - b. Test equipment shall be provided with a label stating the date of last calibration. As a minimum the equipment shall have been calibrated within the past 12 months.
    - c. Test reports shall include the following:
      - 1) Identification of the testing organization.
      - 2) Equipment identification.
      - 3) Ambient conditions.
      - 4) Identification of the testing technician.
      - 5) Summary of project.
      - 6) Description of equipment being tested.
      - 7) Description of tests.
      - 8) Test results.
      - 9) Analysis, interpretation and recommendations.
  2. Utilize the services of an approved independent testing laboratory or a qualified contractor's employee (Technician certified in accordance with ANSI/NETA ETT-2000 Standard for Certification of Electrical Testing Personnel) to perform megger time-resistance insulation testing of branch circuit conductors. Tests must be conducted with wires disconnected at both ends.

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LOW VOLTAGE WIRES (600 VOLT AC)**

- a. Test equipment and report requirements stipulated under paragraph 3.01.N.1 apply to branch circuit testing.
- 3. Tests shall be performed in the presence of the Project Inspector.
- 4. Insulation resistance shall not be less than 100 mega-ohms.

3.2 COLOR CODES

A. General Wiring:

- 1. Color code conductor insulation as follows:

STEM VOLTAGE		
Conductor	208Y/120	480Y/277
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Natural Gray

Neutrals shall be colored-distinguished if circuits of two voltage systems are used in the same raceway.

- 2. For phase and neutral conductors 6 gage or larger, permanent plastic-colored tape may be furnished to mark conductor end instead of coded insulation. Tape shall cover not less than 2 inches of conductor insulation within enclosure.

- B. Signal Systems: Wires for signal systems shall be color-coded and installed under observation of the Project Inspector. Except where otherwise specified, color-coding shall be as follows:

<u>SYSTEM</u>	<u>COLOR CODE</u>
Clocks	Pink, Gray and Orange
Initiating Devices (Non-Addressable)	Red (+) and Black (-)
Fire Alarm Strobes	Orange (+) and Blue (-)
Interruptible 24 Volt Power (4 wire smoke detectors, duct detectors)	Brown (+) and White (-) Note: A single white wire may be common to both

3.3 FEEDER IDENTIFICATION

- A. Feeder wires and cables shall be identified at each point the conduit run is broken by a cabinet, box, gutter, etc. Where terminal ends are available, identification shall be by means of heat shrink wire markers, which provide terminal strain relief. Markers shall be by Tyco Electronics, Panduit, Brady Perma-Sleeve, or equal. Identification in other areas shall be by means of wrap-around tape markers from Tyco Electronics, Panduit, Brady Perma-

**SECTION 26 0519**  
**LOW VOLTAGE WIRES (600 VOLT AC)**

Code or equal. Markers shall include feeder designation, size, and description.

3.4 TAPE AND SPLICE KITS

- A. Splices, joints, and connectors joining conductors in dry and wet locations shall be covered with insulation equivalent to that provided on conductors. Free ends of conductors connected to energized sources shall be taped. Voids in irregular connectors shall be filled with insulating compound before taping. Thermoplastic insulating tape approved by UL, NRTL, or equal for installation as sole insulation of splices shall be furnished and shall be installed according to manufacturer's printed specifications.

3.5 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.6 CLEANUP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION

**SECTION 26 2726  
WIRING DEVICES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Wall switches.
  - 2. Receptacles.
  - 3. Device plates and box covers.
- B. Related Documents: The Contract Documents, as defined in Section 01 1000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
  - 1. As specified in Section 26 0500 - Common Work Results for Electrical.

**1.2 REFERENCES**

- A. As specified in Section 26 0500 - Common Work Results for Electrical.
- B. National Electrical Manufacturers Association (NEMA):
  - 1. NEMA WD 1 - General Requirements for Wiring Devices.
  - 2. NEMA WD 6 - Wiring Device -- Dimensional Requirements.

**1.3 SUBMITTALS**

- A. As specified in Section 26 0500 - Common Work Results for Electrical.

**1.4 QUALITY ASSURANCE**

- A. As specified in Section 26 0500 - Common Work Results for Electrical.
- B. Qualifications:
  - 1. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum 5 years documented experience.

**PART 2 - PRODUCTS**

**2.1 WALL SWITCHES**

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
  - 1. Hubbell, Inc.
  - 2. Leviton Manufacturing, Company, Inc.
  - 3. Pass & Seymour.
  - 4. Division 1 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

**SECTION 26 2726  
WIRING DEVICES**

- B. Provide 20 Amp, 120/277V, specification grade, flush, single pole toggle switches with side and back wired screw terminals. All switches shall be equipped with grounding screws.
- C. Single Pole Switch:
  - 1. Leviton Cat. No.1221-2.
  - 2. P&S Cat. No. PS20AC11.
  - 3. Hubbell Cat. No. HBL1221.
- D. Color: White unless indicated otherwise on architectural drawings.

**2.2 RECEPTACLES**

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
  - 1. Leviton Manufacturing, Company, Inc.
  - 2. Pass & Seymour.
  - 3. Hubbell, Inc.
  - 4. Division 1 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Provide duplex, specification grade, 20 Amp, 120 Volt, 2 pole, 3 wire receptacles with grounding screw.
- C. Duplex Convenience Receptacle:
  - 1. Leviton Cat. No. 5362.
  - 2. P&S Cat. No. 5362.
  - 3. Hubbell Cat. No. HBL5352.
- D. GFCI Receptacle (Side Wired Feed-Thru):
  - 1. Leviton Cat. No. 6599.
  - 2. P&S Cat. No. 2091-SHG.
  - 3. Hubbell Cat. No. HBLGF5362.
- E. Color: White unless indicated otherwise.

**2.3 WALL PLATES**

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
  - 1. P&S Sierra.
  - 2. Hubbell.
  - 3. Leviton.
  - 4. Division 1 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Cover Plate: White smooth thermoplastic unless indicated otherwise on architectural drawings.
  - 1. Sierra TP8-W.
- C. Weatherproof Cover Plate: Gasketed cast metal with hinged gasketed device, listed as weatherproof while in use.
  - 1. Red Dot cast aluminum.

**SECTION 26 2726  
WIRING DEVICES**

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. As specified in Section 26 0500 - Common Work Results for Electrical.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates, and conditions are as required, and ready to receive Work.
  - 1. Verify that outlet boxes are installed at proper height.
  - 2. Verify that wall openings are neatly cut and will be completely covered by wall plates.
  - 3. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

**3.2 PREPARATION**

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean debris from outlet boxes.

**3.3 INSTALLATION**

- A. Install in accordance with NECA "Standard of Installation."
- B. Install devices plumb and level.
- C. Install switches with OFF position down.
- D. Install receptacles with grounding pole on bottom.
- E. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.
- F. Connect wiring devices by wrapping conductor 2/3 of screw diameter in clockwise direction around screw terminal. Tighten screw to 12 pound-inches. Do not use spring pressure devices for wire connections.
- G. Install cover plates on switch, receptacle, and blank outlets.

**3.4 CONSTRUCTION**

- A. Interface with other work:
  - 1. Coordinate locations of outlet boxes provided under Division 26 to obtain mounting heights indicated on Drawings.

**3.5 FIELD QUALITY CONTROL**

- A. As specified in Section 26 0500 – Common Work Results for Electrical.
- B. Inspect each wiring device for defects.
- C. Operate each wall switch with circuit energized and verify proper operation.

**SECTION 26 2726  
WIRING DEVICES**

- D. Verify that each receptacle device is energized.
- E. Test each receptacle device for proper polarity.
- F. Test each GFCI receptacle device for proper operation.

3.6 ADJUSTING

- A. Adjust devices and wall plates to be flush, level, and plumb with wall.

3.7 CLEANING

- A. Division 1 - Execution: Cleaning installed work.
- B. Clean exposed surfaces to remove splatters and restore finish.

**END OF SECTION**

NOT FOR BID

**SECTION 26 5100  
LIGHTING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Lighting Fixtures, including lamps, ballast, wiring, lighting controls, and accessories.
- B. Substitutions:
  - 1. Or approved equal if permitted in Division 1 - Product Requirements: Product options and substitutions.
- C. Related Documents: The Contract Documents, as defined in Division 1 - Summary of Work, apply to the work of this section. Additional requirements and information necessary to complete the work of this section may be found in other documents.
- D. Related Sections:
  - 1. Section 26 0500 – Common Work Results Electrical.

**1.2 REFERENCES**

- A. As specified in Section 26 0500 - Common Work Results Electrical.

**1.3 SUBMITTALS**

- A. Division 1 - Submittal Procedures: Procedures for submittals.
- B. As specified in Section 26 0500 – Common Work Results Electrical.
  - 1. Product Data: Provide dimensions, ratings, and performance data for each fixture specified.
  - 2. Assurance/Control Submittals:
    - a. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.
- C. Division 1 - Closeout Procedures and Training: Procedures for closeout submittals:
  - 1. Operation and Maintenance Data: Submit manufacturer's operation and maintenance instructions for each type of fixture.

**1.4 QUALITY ASSURANCE**

- A. As specified in Section 26 0500 - Common Work Results Electrical.

**1.5 WARRANTY**

- A. Comply with Division 1 requirements.
- B. General Warranty: Special warranty specified in this Section shall not deprive the University of other Rights the University may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by this Contractor under requirements of the Contract Documents.

**SECTION 26 5100  
LIGHTING**

- C. Special Warranty for LEDs' and Drivers: Manufacturers standard form in which manufacturer of LED's and drivers agrees to replace components that fails in materials or workmanship within specified warranty period.

1. LED arrays: 10 years from date of Beneficial Occupancy.
2. Drivers: 10 years from date of Beneficial Occupancy.

1.6 MAINTENANCE

- A. Division 1 - Closeout Procedures and Training: Procedures for closeout submittals.

PART 2 - PRODUCTS

2.1 LUMINARIES – See Drawings

2.2 LAMPS

- A. LED Lamp Manufacturers:
1. Deco Digital,
  2. LA Lighting,
  3. Philips Lighting Company,
  4. Lithonia Lighting
  5. Or approved equal
- B. Lamp Types: As specified for luminaire. Refer to Section 01 6000 for product requirements options.
- C. Mercury Content: Fluorescent lamps must contain low mercury and pass the federal Toxic Characteristic Leaching Procedure (TCLP) test and be classified as non-hazardous waste. Lamp must be marked as such (i.e., green tips, green etchings, etc.)

2.3 BALLASTS

- A. Fluorescent ballasts shall be rapid start, in-rush current limiting, electronic premium type CBM certified and ETL approved, high power factor and of voltage required. Ballasts shall be Advance, Universal, Magnetek or Motorola. Ballasts shall be compatible with occupancy sensors.

2.4 LED LUMINAIRES

- A. General: Except as otherwise indicated, provide LED luminaires, of types and sizes indicated on fixture schedules.
- B. Material and specifications for each luminaire are as follows:
1. Each luminaire shall consist of an assembly that utilizes LEDs as the light source. In addition, a complete luminaire shall consist of a housing, LED array, and electronic driver (power supply).
  2. Each luminaire shall be rated for a minimum operational life of 50,000 hours at an average operating time of 12.0 hours per day. This life rating must be conducted 40C ambient temperature.
  3. The rated operating temperature range shall be -30°C to +40°C.
  4. Each luminaire is capable of operating above 100°F [37°C], but not expected to comply with photometric requirements at elevated temperatures.
  5. Photometry must be compliant with IESNA LM-79 and shall be conducted at 25°C ambient temperature.

**SECTION 26 5100  
LIGHTING**

6. The individual LEDs shall be constructed such that a catastrophic loss or the failure of one LED will not result in the loss of the entire luminaire.
7. Luminaire shall be constructed such that LED modules may be replaced or repaired without replacement of whole luminaire.
8. Each luminaire shall be listed with Underwriters Laboratory, Inc. under UL1598 for luminaires, or an equivalent standard from a nationally recognized testing laboratory.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. As specified in Section 26 0500 - Common Work Results Electrical.

**3.2 INSTALLATION**

- A. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
- B. Install surface mounted luminaires and exit luminaire signs plumb and adjust to align with building lines and with each other. Secure to prevent movement. Mount exit signs to outlet box mounted flush in wall or ceilings. Outlet box for ceiling mounted exit signs: Connect to rigid conduit system.
- C. Install recessed and surface-mounted fixtures, with plaster frames compatible with ceiling and wall systems employed; secure fixtures mechanically to frames.
- D. Recessed fixtures shall fit snugly against ceilings to prevent lightleakage.
- E. Install recessed luminaires to permit removal from below.
- F. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating. In fire rated ceilings recessed luminaires must carry 1-hour UL fire rating classification.
- G. Install earthquake clips to secure recessed grid-supported luminaires in place.
- H. Install wall mounted luminaires, emergency lighting units and exit luminaire signs at height as scheduled.
- I. Install accessories furnished with each luminaire.
- J. Bond products and metal accessories to branch circuit equipment grounding conductor.
- K. Install specified lamps in each emergency lighting unit, exit luminaire sign, and luminaire.

**3.3 FIELD QUALITY CONTROL**

- A. As specified in Section 26 0500 - Common Work Results Electrical.
- B. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

**SECTION 26 5100  
LIGHTING**

3.4 ADJUSTING

- A. Position exit luminaire sign directional arrows as indicated.

3.01 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.5 CLEANING

- A. Remove rubbish, debris, and waste materials from all areas of work each day.
- B. Clean fixture surfaces of dirt, cement, plaster and debris. Furnish cleansers compatible with material surfaces being cleaned.

Payment for items of work identified in Division 26 as identified in the plans and these specifications shall be based on the unit bid pricing for items of work identified as Electrical on the Bid Schedule.

**END OF SECTION**

NOT FOR BID

**SECTION 31 2323  
EXCAVATION AND FILL FOR UTILITIES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

**A. Section Includes:**

1. Excavating, backfilling, and compacting utility trenches such as water, gas, irrigation, storm drain, sewer lines, concrete-encased conduits, and manholes, vaults, valve boxes, catch basins, underground tanks, thrust blocks, yard boxes, pull boxes and other utility appurtenances.

**B. Related Requirements:**

1. Division 01 – General Requirements.
2. Section 31 1000 – Site Clearing.
3. Section 31 2000 – Earth Moving.
4. Section 32 1313 – Concrete Pavement.
5. Section 32 1373 – Concrete Pavement Joint Sealants.
6. Section 32 3119 – Decorative Metal Fences and Gates.
7. Section 32 3913 – Manufactured Metal Bollards.
8. Division 22 – Plumbing.
9. Division 26 – Electrical.

**1.2 SUBMITTALS**

- A.** Imported Soil: A geotechnical engineer, retained by the Owner as an Owner Consultant, shall obtain an initial product Sample for testing in accordance with the terms of Article 3.05 of this section.

**1.3 QUALITY ASSURANCE**

- A.** Comply with the following as a minimum requirement: Standard Specifications for Public Works construction, current edition except as modified herein.
- B.** Sampling, testing, and certification of imported and/or exported soils shall be performed in accordance with Section 01 4524 - Environmental Import/Export Material Testing.

**1.4 PROJECT CONDITIONS**

- A.** Information on Drawings or in soils report does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.
- B.** A copy of the foundation investigation and soils report is available for examination at the Architect's office during regular business hours of Architect.

**PART 2 - PRODUCTS**

**SECTION 31 2323  
EXCAVATION AND FILL FOR UTILITIES**

2.1 MATERIALS

- A. Bedding material from trench bottom to one foot above the pipe:
  - 1. Sand, gravel, crushed aggregate or native free-draining granular material providing a sand equivalent of at least 30 or a coefficient of permeability greater than 1.4 inches per hour.
  - 2. Sand complying with the Specifications for cement concrete aggregates.
- B. Backfill Materials:
  - 1. Excavated trench material to be installed for backfilling shall be clean, free of large clods, and stones larger than 2 ½-inch in any dimension.
  - 2. Cement-sand slurry shall be provided with one sack of cement per cubic yard of the mixture.
  - 3. Imported Fill Material: Imported fill material shall be a granular material with sufficient binder to form a firm and stable unyielding subgrade and shall not have more than 60 percent of fines passing a 200-mesh sieve. Material shall provide a coefficient of expansion of not more than two percent from air dry to optimum moisture content and not more than six percent from air dry to saturation. Imported materials shall be clean and free of rubbish, debris, and toxic or hazardous contaminants. Adobe or clay soils are not permitted.

PART 3 - EXECUTION

3.1 GENERAL

- A. Before excavation, contact the "Underground Service Alert of Southern California" (USASC) for information on buried public utilities and pipelines. For on-site utilities retain an underground locating service.
- B. Barricade trenches, ditches, pits, sumps, and similar Work outside the barricaded working area with chain link fence as specified in Section 01 5000 - Construction Facilities and Temporary Controls, and in accordance with Cal-OSHA standards and requirements.
- C. Saw-cut concrete or bituminous paving for trench installation.
- D. Trenches over five feet in depth shall conform to the Cal-OSHA.
- E. Where indicated and required to excavate in lawn areas, protect adjoining lawn areas outside of the Work area. Replace or install removed sod upon completion of backfill by installing sod level with adjacent lawns. If installation of removed sod fails, furnish sod, and install to match existing lawns.
- F. Backfill over excavations to the required elevations with earth, gravel, sand, or concrete and compact as required. Provide excavations free from standing water by pumping, draining, or providing protection against water

**SECTION 31 2323  
EXCAVATION AND FILL FOR UTILITIES**

intrusion. Slope adjacent grades away from excavations to minimize entry of water.

- G. Do not install piping lengthwise under concrete walks without review by the Architect.
- H. Do not excavate trenches parallel to footings closer than 18 inches from the face of the footing or below a plane having a downward slope of two horizontal to one vertical, from a line 9 inches above bottom of footings.
1. Unless otherwise indicated on Drawings, depth of excavations outside the buildings shall allow for a minimum coverage above top of pipe, tank, or conduit measured from the lowest adjoining finished grade, as follows:

Steel Pipe	24 inches below finished grade
Copper Water Tube	18 inches below finished grade
Cast-Iron Pressure Pipe	36 inches below finished grade
Plastic Pipe (other than waste)	30 inches below finished grade
Tanks or other structures	36 inches below finished grade
Soil, Sewer & Storm Drain	minimum 18 inches below finished grade, and as required for proper pitch and traffic load. (Install polypropylene sewer pipe with at least 24 inches coverage)
Irrigation Pipe:	nonpressure pipe 12 inches, pressure pipe 24 inches
  2. Trench width shall provide ample space for fitting and joining. Excavate for piping bells and fittings, bell and faucet pipe and other fittings.
- I. Unless indicated otherwise, excavate trenches to the required depths for utilities, such as pipes, conduit, and tanks, with minimum allowances of 6 inches at the bottom and 6 inches at the sides for bedding of unprotected piping or as required for concrete encasement of conduits as indicated on Drawings. Grade the bottom of trenches to a uniform smooth surface. Remove loose soil from the excavation before installing sand bedding or concrete encasement.
- J. Provide excavations free from standing water by pumping, draining, or providing protection against water intrusion. If soil becomes soft, soggy, or saturated, excavate to firm undisturbed soil and fill as required. Slope adjacent grades away from excavations to minimize entry of water.
- K. Provide a minimum clear dimension of 2 inches from sides of wall excavation to outer surfaces of buried pipes or conduits installed in the same trench or outside surfaces of containers and tanks.
- L. Do not install backfill until required inspections and testing are completed.
- M. Backfill electrical or other excavated utility trenches located outside of barricaded installation areas within 24 hours after inspection by the Project Inspector.

**SECTION 31 2323  
EXCAVATION AND FILL FOR UTILITIES**

- N. Install backfill materials in layers not exceeding 4 inches in thickness and compact to 90 percent of the maximum density but no less than what is recommended contained in the soils report.
- O. If materials excavated from the Project site are not permitted for trench backfill in paved areas, backfill trenches with a cement-sand slurry mix. Install backfill to an elevation of the existing undisturbed grade plus one inch.
- P. Provide compact sand bedding to provide a uniform full length bearing under piping and conduits.
- Q. Where portions of existing structures, walks, paving, or other improvements are removed or cut for piping or conduit installation, replace the material with equal quality, finished to match adjoining existing improvements as specified in Section 32 1313 – Concrete Pavement.

3.3 INSPECTION AND TESTING

- A. The geotechnical engineer, retained by the Owner as an Owner Consultant, will inspect and test excavations, sample material quality as required in Part 2, observe installation and compaction of fill materials.
- B. Compaction test shall be performed in accordance with ASTM D1557, method "C."

3.4 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.5 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of them off the Project site.

END OF SECTION

REVERSE OSMOSIS SYSTEM

REVISIONS

DETAIL	DESCRIPTION
SYSTEM CONTROL TYPE	MICROPROCESSOR
HIGH PRESSURE PUMP	
PRESSURE VESSELS	1 X 4" @ 300 PSI
MEMBRANE	
<b>POWER</b>	
MAIN POWER (SYSTEM)	208-240V/1ph/60Hz
CONTROL POWER	208-240V/1ph/60Hz
<b>FLOW RATES</b>	
DAILY CAPACITY	1,500 GPD
FEED WATER FLOW RATE	
PERMEATE FLOW RATE	
REJECT FLOW RATE	
RECIRC. FLOW RATE	
<b>INTERFACES</b>	
FEED	
PRODUCT	1/2" MNPT
REJECT	1/2" MNPT

REV.	REVISION COMMENTS	DATE	APPROVED BY

**NOTE:**

ALWAYS REFER TO THE INCLUDED P&ID, PROJECTIONS, AND OPERATION MANUALS FOR ADDITIONAL INFORMATION DETAILING OPERATING PARAMETERS AND CONDITIONS NECESSARY FOR SAFE AND RELIABLE OPERATION

D

D

C

C

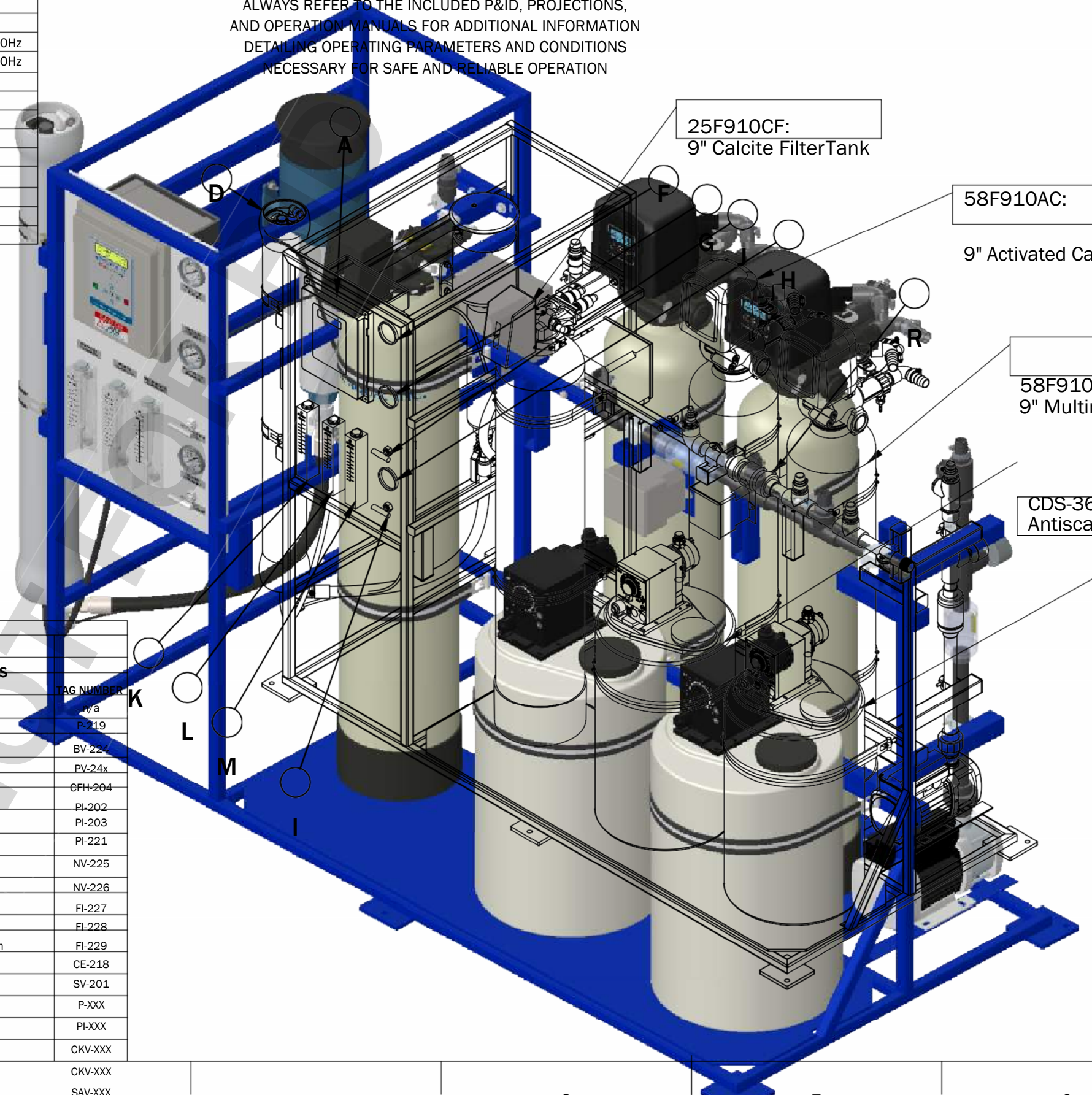
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A

A

ID	DESCRIPTION	TAG NUMBER
A	Control	SV-201
B	High Pressure Pump	P-219
C	Pump Throttle Valve, 3/4" BV	BV-224
D	Pressure Vessels	PV-24x
E	5µ Cartridge Filter, 4.5" x 10	GFH-204
F	Pre Filter Pressure Gauge, 0-100 psi	PI-202
G	Post Filter Pressure Gauge, 0-100 psi	PI-203
H	System Pressure Gauge, 0-350 psi	PI-221
I	Reject Control Valve, 1/2"	NV-225
J	Recirculation Control Valve, 1/2"	NV-226
K	Permeate Flow Meter, PMF 0.2-2 gpm	FI-227
L	Reject Flow Meter, PMF 0.5 - 5 gpm	FI-228
M	Recirculation Flow Meter, PMF 0.5 - 5 gpm	FI-229
N	Conductivity Sensor, 0-250 ppm	CE-218
O	Inlet Solenoid Valve, 3/4" FNPT	SV-201
P	Feed Backwash Pump	P-XXX
Q	Feed Pump Pressure Gauge	PI-XXX
R	Drain Check Valve	CKV-XXX
S	Feed Line Check Valve	CKV-XXX
T	Sample Valve	SAV-XXX



**PURE AQUA, INC.®**  
 2230 South Huron Drive, Santa Ana, CA 92704 USA  
 Phone: +1 (714) 432-9996 Fax: +1 (714) 432-9898 WWW.PUREAQUA.COM

PREPARED FOR: **Ken Thoresen**

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TITLE: **BRACKISH WATER, REVERSE OSMOSIS SYSTEM, BW-1.5K-140** MODEL NUMBER: **BW-1.5K-140**

1-PV, 1 ELEMENT LONG-GENERAL ARRANGEMENT JOB NUMBER: **S014001**

DRAWING NUMBER: **S014001**

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**BW-1.5K-140-14001**  
DRAWN BY: I.De Santiago DATE: 2023-11-01

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1 OF 4 NTS

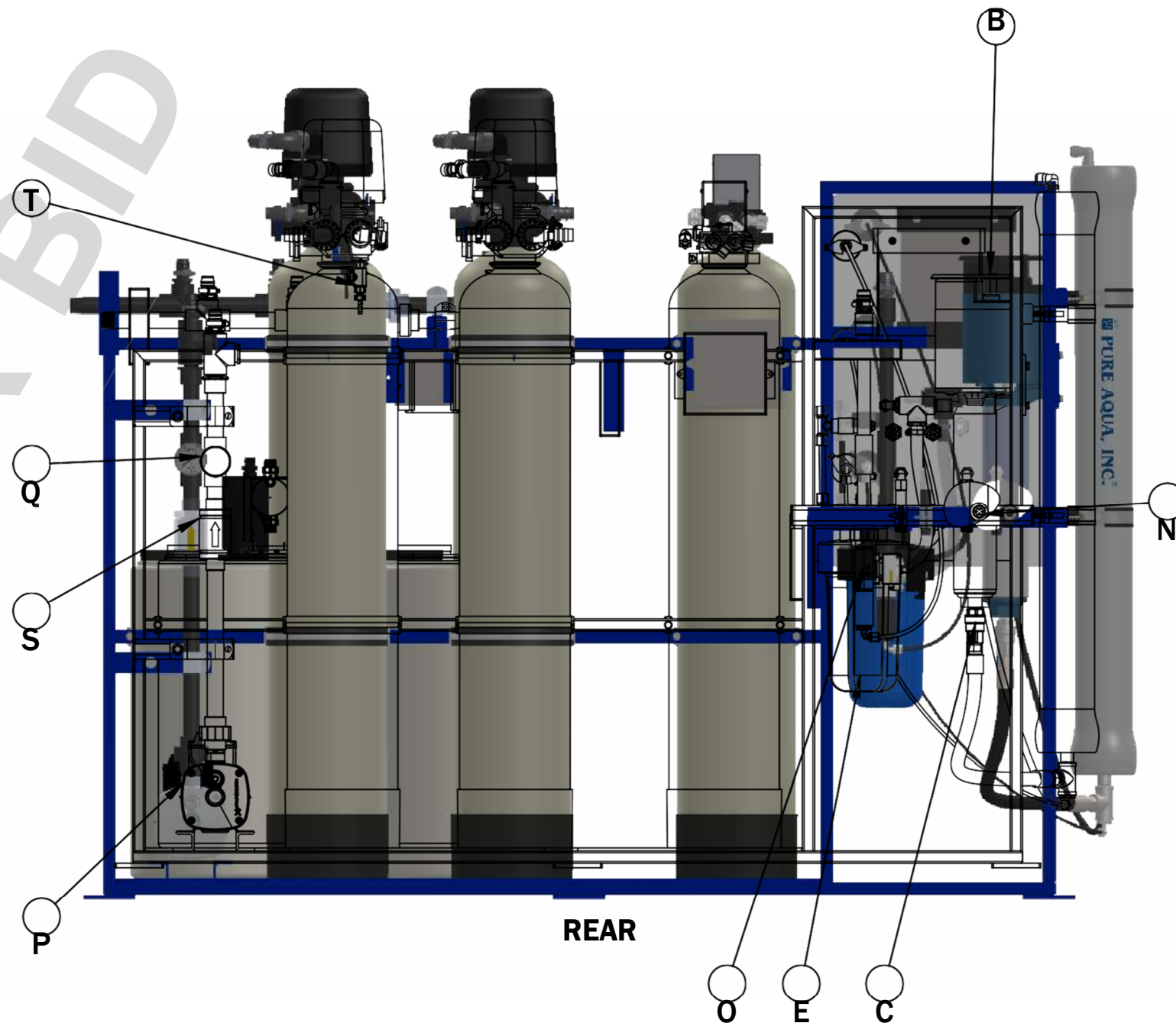
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NOT FOR BID

REVERSE OSMOSIS SYSTEM

DETAIL	DESCRIPTION
SYSTEM CONTROL TYPE	MICROPROCESSOR
HIGH PRESSURE PUMP	
PRESSURE VESSELS	1 X 4"@ 300 PSI
MEMBRANE	
<b>POWER</b>	
MAIN POWER (SYSTEM)	208-240V/1ph/60Hz
CONTROL POWER	208-240V/1ph/60Hz
<b>FLOW RATES</b>	
DAILY CAPACITY	1,500 GPD
FEED WATER FLOW RATE	
PERMEATE FLOW RATE	
REJECT FLOW RATE	
RECIRC. FLOW RATE	
<b>INTERFACES</b>	
FEED	
PRODUCT	1/2" MNPT
REJECT	1/2" MNPT

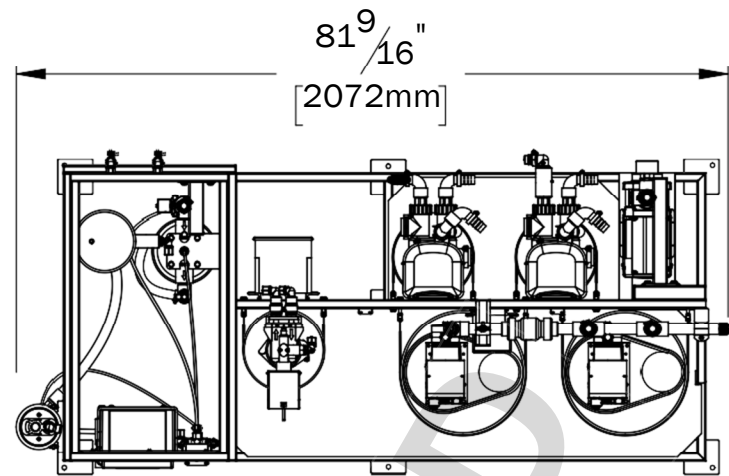


SYSTEM COMPONENTS		
ID	DESCRIPTION	TAG NUMBER
A	Control	n/a
B	High Pressure Pump	P-219
C	Pump Throttle Valve, 3/4" BV	BV-224
D	Pressure Vessels	PV-24x
E	5µ Cartridge Filter, 4.5" x 10	CFH-204
F	Pre Filter Pressure Gauge, 0-100 psi	PI-202
G	Post Filter Pressure Gauge, 0-100 psi	PI-203
H	System Pressure Gauge, 0-350 psi	PI-221
I	Reject Control Valve, 1/2"	NV-225
J	Recirculation Control Valve, 1/2"	NV-226
K	Permeate Flow Meter, PMF 0.2-2 gpm	FI-227
L	Reject Flow Meter, PMF 0.5 - 5 gpm	FI-228
M	Recirculation Flow Meter, PMF 0.5 - 5 gpm	FI-229
N	Conductivity Sensor, 0-250 ppm	CE-218
O	Inlet Solenoid Valve, 3/4" FNPT	SV-201
P	Feed Backwash Pump	P-XXX
Q	Feed Pump Pressure Gauge	PI-XXX
R	Drain Check Valve	CKV-XXX
S	Feed Line Check Valve	CKV-XXX
T	Sample Valve	SAV-XXX

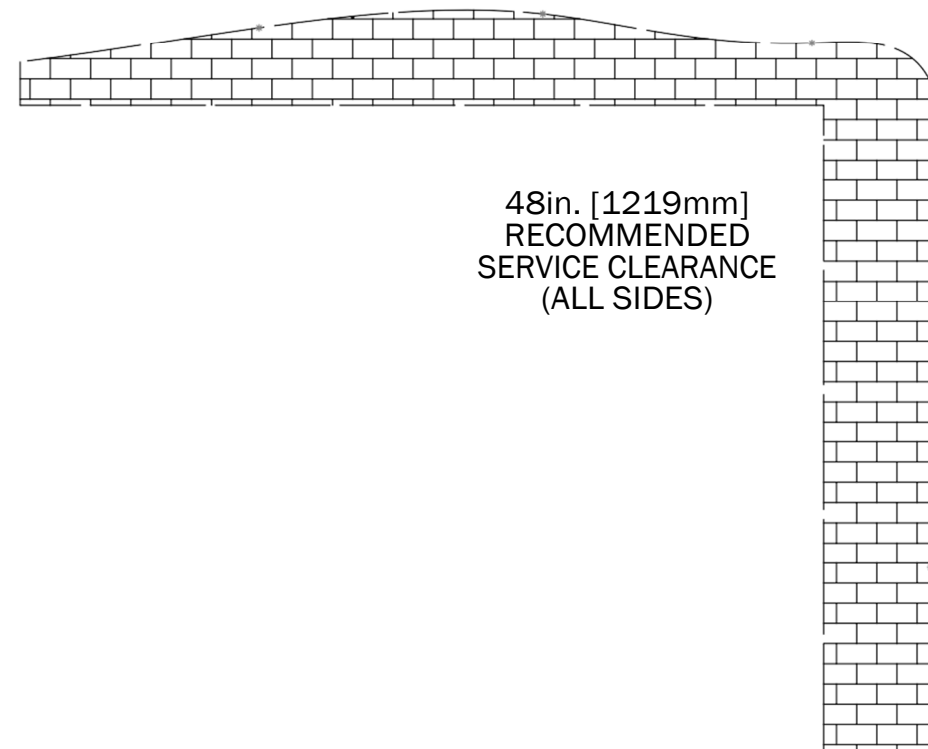
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**PURE AQUA, INC.®**  
 2230 South Huron Drive, Santa Ana, CA 92704 USA  
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TITLE: <b>BRACKISH WATER, REVERSE OSMOSIS SYSTEM, BW-1.5K-140 1-PV, 1 ELEMENT LONG-GENERAL ARRANGEMENT</b>	DRAWING NUMBER: <b>BW-1.5K-140-14001</b>
DRAWN BY: I. De Santiago	JOB NUMBER: [REDACTED]

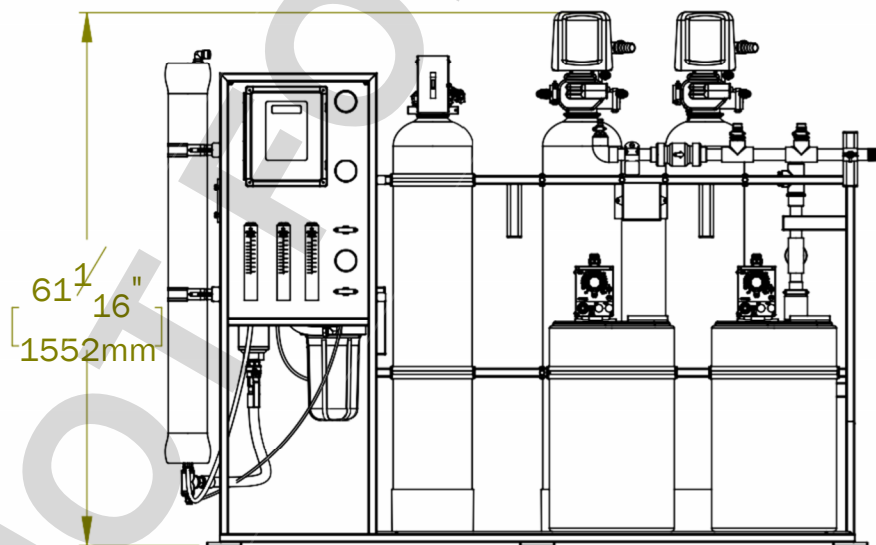
NOT FOR BID



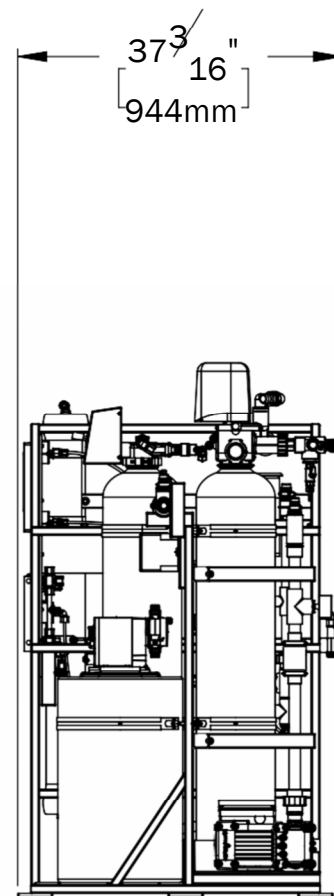
TOP



48in. [1219mm]  
RECOMMENDED  
SERVICE CLEARANCE  
(ALL SIDES)



FRONT



RIGHT

NOT FOR BIDDING

ENGINEERED BY:  
**PURE AQUA, INC.®**

2230 South Huron Drive, Santa Ana, CA 92704 USA  
Phone: +1 (714) 432-9996 Fax: +1 (714) 432-9898 WWW.PUREAQUA.COM

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TITLE:  
**BRACKISH WATER, REVERSE  
OSMOSIS SYSTEM, BW-1.5K-  
140 1-PV, 1 ELEMENT LONG-  
GENERAL ARRANGEMENT**

DRAWING NUMBER:  
**BW-1.5K-140-14001**

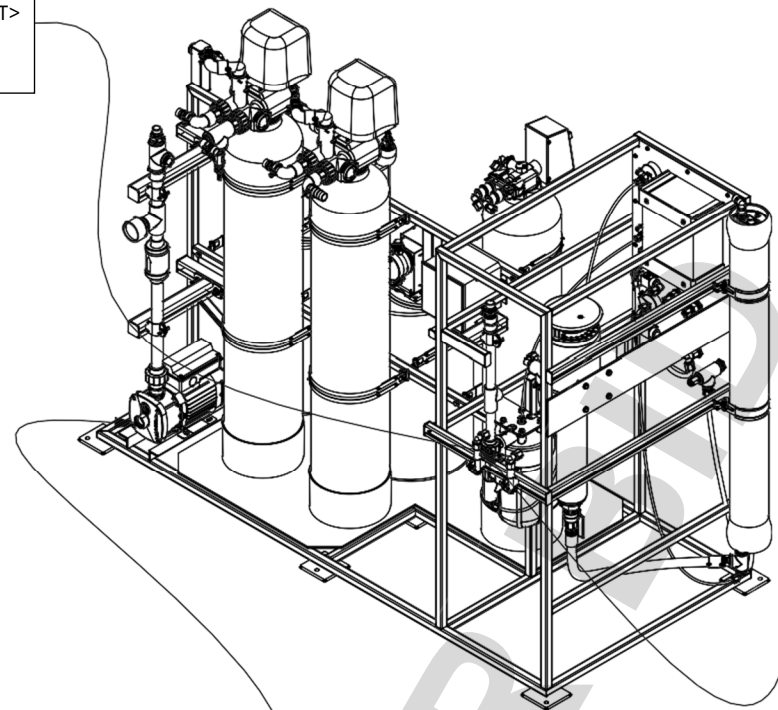
DRAWN BY: I. De Santiago

DIMENSIONS (OVER ALL)			WEIGHTS		TOLERANCES
Height	Length	Depth	Dry Weight (Approx.)	Wet Weight (Approx.)	
61 1/16" [1552mm]	81 9/16" [2072mm]	37 3/16" [944mm]			LINEAR DIMENSIONS ± 0.50 INCHES ANGULAR DIMENSIONS ± 1/4°

61 1/16" [1552mm]	81 9/16" [2072mm]	37 3/16" [944mm]
----------------------	----------------------	---------------------

**NOT FOR BID**

**INTERFACE**  
 <PERMEATE OUTLET>  
**TIE-231**  
 1/2" MNPT



**INTERFACE**  
 <REJECT OUTLET>  
**TIE-232**  
 1/2" MNPT

34<sup>5</sup>/<sub>8</sub>"  
 [879mm]

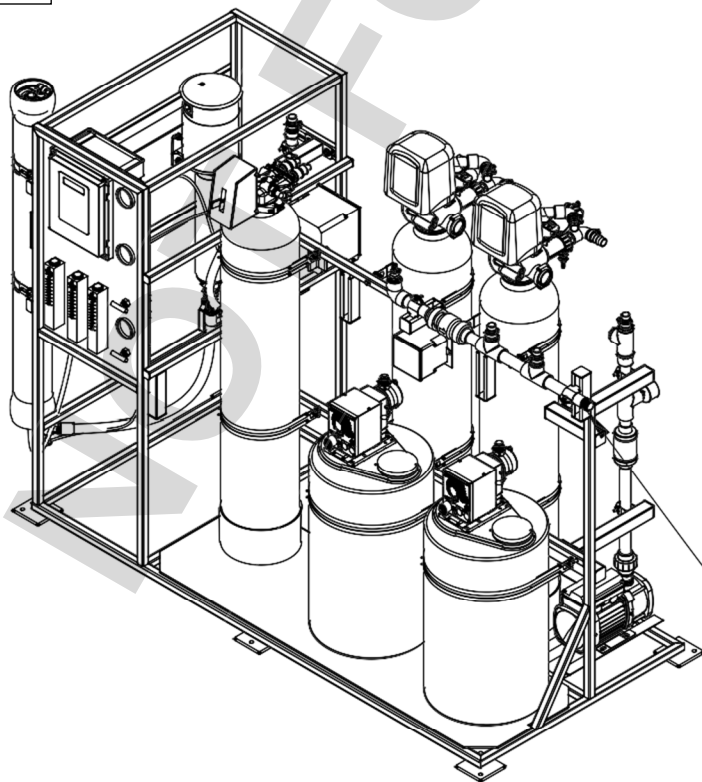
3/4"  
 [19mm]      3/4"  
 [19mm]

37<sup>1</sup>/<sub>8</sub>"  
 [943mm]

37<sup>1</sup>/<sub>8</sub>"  
 [943mm]

**MOUNTING FOOTPRINT**

**INTERFACE**  
 <FEED WATER INLET>  
**TIE-200**  
 1" MNPT



**INTERFACE**  
 <DRAIN OUTLET>  
**TIE-247**  
 1" MNPT

**CAUTION!**  
**TO PREVENT INJURY OR DAMAGE:**

- USE ONLY PLASTIC NPT THREADED CONNECTIONS
- USE FLEXIBLE HOSES TO CONNECT TO THE SYSTEM INTERFACES
- SYSTEM MUST BE ANCHORED SECURELY IN PLACE BEFORE OPERATING
- WHERE APPLICABLE NATIONAL AND LOCAL CODES AND STANDARDS APPLY

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**BRACKISH WATER, REVERSE  
 OSMOSIS SYSTEM, BW-1.5K-  
 140 1-PV, 1 ELEMENT LONG-  
 GENERAL ARRANGEMENT**

DRAWING NUMBER:  
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 I.De Santiago

NOT FOR BID