

*SPECIFICATIONS FOR*

**FREEDOM PARK RESTROOM AND  
SNACK BAR BUILDING  
ACCESSIBILITY IMPROVEMENTS**

**VENTURA COUNTY, CALIFORNIA**

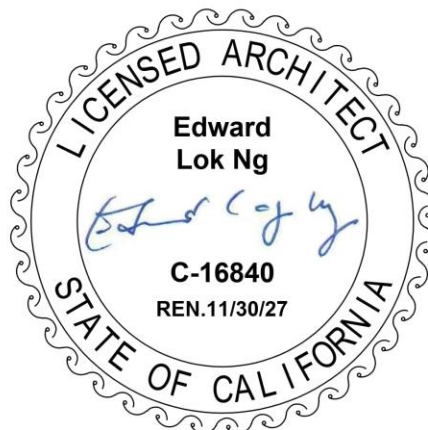
PREPARED FOR:

PLEASANT VALLEY RECREATION AND PARK DISTRICT

May 2026

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**SECTION 000101  
PROJECT DIRECTORY**

Title : **FREEDOM PARK RESTROOM AND SNACK BAR, BUILDING  
ACCESSIBILITY IMPROVEMENTS**

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## 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 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. General contractor to be responsible for all demolition in preparation for new work.
  - 2. Remodel existing snack bar building and its restrooms and replacement of exterior walkway and new detectable warning domes. The work to be performed includes:
    - a. **EXTERIOR: Site:** Replace non-compliant walkway with a compliant path of travel to the building entrances from arrival points and provide detectable warning dome mat between hazardous vehicular areas.
    - b. **EXTERIOR: Building,** provide new roof overhang, new solar tubes, new dormer vents, new make-up air, replacement of light fixtures with new LED light fixture type, power wash all exterior walls and provide new paint finish of existing building.
    - c. **INTERIOR OF BUILDING: Restrooms:** Renovation to provide saw cutting & removal of the concrete slab & CMU partition walls for new replacement of plumbing fixtures, partitions, accessories, replacement of new LED light fixtures, new paint finish, new concrete polish, new porcelain wall tile, and new gates & gate hardware, new doors & hardware, and signage for accessibility compliance.
    - d. **INTERIOR OF BUILDING: Snack Bar:** Sawcut & replace concrete slab, repair/remodel with new quarry tile floor & quarry cove base, replace counter tops, new roll up doors, new sliding service windows, new air curtains, new supply fan, new doors and door hardware, replacement of lights with new LED lighting fixtures, new plumbing fixtures, new floor sinks, replacement of electrical outlets/switches, new tables, replacement of non-compliant kitchen equipment. Removal of existing kitchen appliances and new type kitchen equipment per plan. Contractor to disposed of unusable kitchen equipment and to coordinate with District for storage of existing equipment to be re-use and to verify and protect existing equipment condition.
    - e. **Building electrical: Electrical work:** Provide new step-down transformer with new breaker, circuiting, and a new panel. Provide electrical services from building electrical service panel to on site and in space. Provide circuiting to Snack Bar equipment, HVAC, Plumbing, Lighting, Receptacles, and ancillaries, new lighting, and lighting controls to comply with title 24.

**SECTION 01 1000  
SUMMARY OF WORK**

- 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 shall apply.

1.2 MISCELLANEOUS CONTRACT EXPENSES

- A. The Contractor must include in its bid the cost fees or charges payable to State, local, District, or special community development agencies unless otherwise stated in the General Requirements. Contractor will not be required to obtain building permits from the County's Building Department.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTIONI (Not used)

END OF SECTION

**SECTION 01 2513  
PRODUCT SUBSTITUTION PROCEDURES**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. This Section includes administrative and procedural requirements for handling requests for substitutions submitted 60 days after the date established in the Notice of Award and pursuant to Article 6.14 of the General Conditions.

**1.2 RELATED REQUIREMENTS**

- A. Section 01 3300: Submittal Procedures.
- B. Section 01 6000: Product Requirements.
- C. Section 01 7000: Execution and Closeout Requirements.

**PART 2 - PRODUCTS - N/A**

**PART 3 - EXECUTION**

**3.1 APPLICATION**

- A. CONTRACTOR proposed changes in products or materials required by the Contract Documents 60 days or more after the Notice of Award are requests for substitutions. DISTRICT will consider requests for substitution if a product is no longer manufactured or the DISTRICT and ARCHITECT, after a diligent search have verified that product or material is not available to CONTRACTOR. The following are not considered to be valid requests for substitutions:

- 1. Revisions to the Contract Documents requested by Owner or ARCHITECT.
- 2. Specified options of products included in the Contract Documents.
- 3. Substitutions requested on a "or equal" basis.

**3.2 SUBMITTALS**

- A. Transmit submittals as described in related Sections for each request for substitution.
  - 1. Identify the product to be replaced in each request. Include related Specification Section and Drawing number.

**SECTION 01 2513**  
**PRODUCT SUBSTITUTION PROCEDURES**

2. Provide complete documentation denoting compliance with the requirements for substitutions, and the following information, as appropriate.
  - a. A detailed comparison of the significant qualities of the proposed substitution with those specified in the Contract Documents. Significant qualities may include elements, such as performance, weight, size, durability, and visual effect.
  - b. Product Data, including Drawings, descriptions of products, fabrication, and installation procedures.
  - c. Samples, where applicable or requested.
  - d. CONTRACTOR certification the proposed substitution conforms to requirements of the Contract Documents in every respect and is appropriate for the applications indicated.
  - e. CONTRACTOR waiver of rights to an increase in the Contract Amount, Milestones and/or Contract Time that may subsequently become necessary because of the failure of the substitution to adequately perform.
3. If required, ARCHITECT will request additional information or documentation for evaluation. DISTRICT will notify CONTRACTOR of acceptance or rejection of the substitution.
4. ARCHITECT will review and consider request for substitution and provide a recommendation to DISTRICT.
5. Where a proposed substitution involves and/or affects more than one Subcontractor, CONTRACTOR shall ensure each Subcontractor cooperates with the other Subcontractor involved to coordinate the Work, provide uniformity and consistency, and assure compatibility of all products.
6. CONTRACTOR submittal and ARCHITECT review of Shop Drawings, Product Data, material lists or Samples do not constitute an acceptable or valid request for substitution.

END OF SECTION

**SECTION 01 2976  
PROGRESS PAYMENT PROCEDURES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies administrative and procedural requirements for a certified Application for Payment.
  - 1. Coordinate the certified Schedule of Values and certified Application for Payment with, but not limited to, the Construction Schedule, submittal log, and list of Subcontractors.

**1.2 RELATED REQUIREMENTS:**

- A. Section 01 3300 – Submittal Procedures.
- B. Section 01 7704 – Closeout Procedures and Training.

**PART 2 - PRODUCTS - N/A**

**PART 3 - EXECUTION**

**3.1 APPLICATION FOR PAYMENT**

- A. Each certified Application for Payment shall be consistent with previous applications and payments as reviewed by Engineer, paid for by DISTRICT, and:
  - 1. The initial Application for Payment and Final Application for Payment at time of Substantial Completion involve additional requirements.
- B. Payment Application Times: The period of Work covered by each Application for Payment is payment date for each progress payment as specified in the General Conditions. The period covered by each Application for Payment is previous month.
- C. Payment Application Forms: Use City provided forms for the Application for Payment.
- D. Application Preparation: Complete every entry on the form. Include execution by a person authorized to sign legal documents on behalf of General Contractor. Engineer will return incomplete applications without action.
- E. Transmittal: Submit a minimum of four signed and original copies of each certified Application for Payment to Engineer. All copies shall be complete, including releases and similar attachments.

**SECTION 01 2976**  
**PROGRESS PAYMENT PROCEDURES**

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information related to the application, in a manner acceptable to Engineer.
- F. Initial Application for Payment within 60 days of issuance of Notice to Proceed: Administrative actions and submittals that must precede or coincide with submittal for first certified Application for Payment include, but are not limited to, the following:
1. Certified Schedule of Values.
  2. Performance and payment bonds.
  3. List of principal suppliers and fabricators.
  4. Worker Compensation certificates, if applicable.
  5. Auto Insurance, if applicable.
  6. Hazardous Material Insurance Certificates, if applicable.
  7. Construction Schedule.
  8. Submittal Schedule.
  9. Emergency Contact List.
  10. Copies of authorizations and licenses from governing authorities for performance of Work.
  11. Certified Payroll (Submitted directly to Labor Compliance in electronic format as specified by District including hard copy).
- G. Applications for Payment: Administrative actions and submittals that must precede or coincide with submittal of Progress Applications for Payment include, but are not limited to, the following:
1. Certified Payroll (submitted directly to Labor Compliance in electronic format as specified by District including hard copy).
  2. Updated and current Project Record Drawings (as built).
  3. Monthly Construction Schedule (updated, submitted, and approved).
  4. Approved Schedule of Values.
  5. List of Subcontractors (Payments Summary).
- H. Final Application for Payment at Substantial Completion: Following Engineer issuance of certificate of Substantial Completion, submit an Application for Payment:
1. Administrative actions, submittals, and/or Work that shall precede or coincide with this application include:
    - a. Occupancy permits and similar approvals by authorities having legal jurisdiction over Work.
    - b. Removal of temporary facilities and services.
    - c. Testing, adjusting, and balance records.
    - d. Removal of surplus materials, rubbish, and similar elements.
    - e. Meter readings.
    - f. Start-up performance reports.
    - g. District personnel training and orientations.
    - h. Operating and maintenance instruction manuals.
    - i. Preliminary Warranties, guarantees, and maintenance agreements.
    - j. Delivery of extra materials, products and or stock.

**SECTION 01 2976**  
**PROGRESS PAYMENT PROCEDURES**

- k. Change over information related to District occupancy, use, operation, and maintenance.
- l. Final cleaning.
- m. Ensure that Work is completed.
- n. Advise on shifting insurance coverage.
- o. List of defective Work recognized as exceptions to certificate of Substantial Completion.
- p. Change of door locks, including keys, to District system.
- q. Certified Payroll (submitted directly to Labor Compliance in electronic format as specified by the District including hard copy).
- r. Certification that all benefit contributions due and owing to appropriate union trusts has been paid by General Contractor and Subcontractors, as specified by the Project Stabilization Agreement (PSA) and Article 6.49 of the General Conditions.
- s. Waivers and releases for General Contractor.

Payment amount to be based on actual quantities of work completed and unit bid prices. Total bid item quantities completed x unit bid price.

END OF SECTION

**SECTION 01 3113**  
**PROJECT COORDINATION**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. This Section specifies administrative and procedural requirements necessary for coordinating Work operations for Design Bid Build projects including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. Coordination drawings.

**1.2. RELATED REQUIREMENTS**

- A. Section 01 3300: Submittal Procedures.
- B. Section 01 7700: Contract Closeout.

**PART 2 - PRODUCTS – N/A**

**PART 3 - EXECUTION**

**3.1 COORDINATION**

- A. CONTRACTOR shall coordinate operations included in various sections of Contract Documents to assure efficient and orderly installation of each part of Work. Coordinate Work operations included under related sections of Contract Documents that depend on each other for proper installation, connection, and operation of Work, including but not limited to:
  - 1. Schedule construction operations in sequence required where installation of one part of Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.
  - 3. Provide provisions to accommodate items scheduled for later installation.
  - 4. Prepare and administer provisions for coordination drawings.
- B. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required in notices, reports, attendance at meetings, and:

**SECTION 01 3113**  
**PROJECT COORDINATION**

1. Prepare similar memoranda for PROJECT MANAGER and Separate Work Contract where coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of Work. Such administrative activities include, but are not limited to, following:
1. Preparation of schedules.
  2. Installation, relocation, and removal of temporary facilities.
  3. Delivery and processing of submittals.
  4. Progress meetings.
  5. Project closeout activities.
- D. Conservation: Coordinate Work operations to assure operations are carried out with consideration given to conservation of energy, water, materials, and:
1. Salvage materials and equipment involved in performance of but not actually incorporated into Work.

3.2 SUBMITTALS

- A. Coordination Drawings and Files: CONTRACTOR shall prepare coordination drawings to coordinate the installation of products and materials fabricated, furnished, and installed by separate entities, under different parts of the Contract. CONTRACTOR shall notify PROJECT MANAGER and ARCHITECT of all major conflicts in writing in a timely manner so that the design team can respond without construction delays. Coordination drawings shall address the following at a minimum:
1. Limitations in available space for installation or service. CONTRACTOR shall overlay plans of each trade and verify space requirements and conflicts between trades. Minor changes and adjustments that do not affect design intent shall be made by CONTRACTOR and shall be highlighted for ARCHITECT'S review.
  2. Incompatibility between items provided under different trades (such as difference in voltage between equipment specified under Divisions 22 and 23 and electrical power provided under Division 26.)
  3. Inconsistencies between drawings, specifications, and codes (between trades and within each trade).

**SECTION 01 3113**  
**PROJECT COORDINATION**

4. Additional items required for existing facilities construction projects shall be designed and prepared from available as-built drawings that are verified through non-invasive and non-destructive, visual observation only. CONTRACTOR shall field verify actual existing conditions during and upon completion of demolition work and incorporate findings into preparation of co-ordination drawings. Minor changes and adjustments that do not affect design intent shall be made by Sub-Contractor and shall be highlighted for PROJECT MANAGER and ARCHITECT'S reviews.
- B. Prepare coordination drawings in CAD with each trade on a separate layer, in specified color and scale. CONTRACTOR and each Subcontractor shall provide and forward reproducible copies and CAD drawing files in the order described here:
1. HVAC Subcontractor will indicate all ductwork, piping, and equipment complete with installation and dimensioned service clearances, duct, and pipe sizes, fitting types and sizes, top or bottom of duct and pipe elevations, distances of ducts, pipes and equipment from building reference points and hanger and support locations. Minor changes and adjustments that do not affect design intent shall be made by Subcontractor and shall be highlighted for PROJECT MANAGER and ARCHITECT'S reviews. Forward drawings to plumbing Subcontractor for further co-ordination. HVAC items shall be indicated using orange lines.
  2. Plumbing Subcontractor will indicate all plumbing lines, and equipment complete with installation and dimensioned service clearances, pipe sizes, fitting types and sizes, top or bottom of pipe elevations, distances of pipes and equipment from building reference points and hanger/support locations Co-ordinate with HVAC Subcontractor. Minor changes and adjustments that do not affect design intent shall be made by Sub-contractor and shall be highlighted for PROJECT MANAGER and ARCHITECT'S reviews Upon completion drawings shall be forwarded to OTHER Subcontractor for further co-ordination. All Plumbing items shall be indicated using blue lines.
  3. Electrical and Low Voltage Subcontractors will indicate service, and feeder conduit runs and other electrical equipment complete, including low voltage with installation and dimensioned service clearances, sizes, top or bottom of conduit and rack elevations, distances of conduits and equipment from building reference points and hanger and support locations. Co-ordinate with Plumbing and HVAC Subcontractors. Minor changes and adjustments that do not affect design intent shall be made by sub-contractors and shall be highlighted for PROJECT MANAGER and ARCHITECT'S reviews. Upon completion drawings shall be forwarded to CONTRACTOR for further co-ordination. Electrical work shall be indicated in dark green lines. Low voltage work shall be indicated in light green lines.

**SECTION 01 3113**  
**PROJECT COORDINATION**

4. CONTRACTOR will be responsible for the overall coordination review. As directed by PROJECT MANAGER and/or ARCHITECT. As each coordination drawing is completed, CONTRACTOR will meet with PROJECT MANAGER to review and resolve all conflicts on coordination drawings.
- C. Shop Drawing Submittals
1. Once coordination is complete, General Contractor is required to submit for approval annotated, as-fabricated drawings as are required to make a complete representation of the entire scope. These drawings must be fully dimensioned projections including, but not limited to, plans, sections, elevations, and axonometric diagrams. The number, format, and medium of these drawings shall be determined in the Subcontractor's contract. Printed copies must be delivered to per submittal requirements.
  2. The General Contractor shall be responsible for incorporating Design or Field Revisions initiated after the sign-off of a given Zone into the Consolidated Model as negotiated with Owner and according to the sequence set forth in this document.
- D. Closeout and As-Built Plans
1. The General Contractor is responsible to provide complete, up to date, coordinated plans, in DWG format at the completion of the coordination process.
  2. General Contractor shall require Subcontractors to maintain their drawings throughout the construction process and reflect any changes in response to coordination changes or to RFIs, ASIs, Bulletins, Addenda and Owner's Directives.
  3. At closeout, the Subcontractor must re-submit any shop drawings to reflect changes that occurred during the plans coordination.
  4. At closeout General Contractor shall provide complete As-Built record files to Owner / project manager per District Submittal and Close out requirements.

END OF SECTION

**SECTION 01 3119  
PROJECT MEETINGS**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. This Section specifies administrative and procedural requirements for Project meetings, including but not limited to, the following:
  - 1. Job start meeting.
  - 2. Pre-installation conferences.
  - 3. Progress meetings.
  - 4. Meetings as required by Owner.

**1.2 RELATED REQUIREMENTS**

- A. Division 1

**PART 2 – PRODUCTS - N/A**

**PART 3 - EXECUTION**

**3.1 JOB START MEETING**

- A. In accordance with General Conditions Article 2.6, Owner will schedule a job start meeting before starting the Work, at a time and date determined by Owner. Meeting shall be held at the Project site, or another location as determined by Owner. Meeting will be held in order to review responsibilities, procedures, and other administrative requirements contained within the Contract Documents.
- B. Authorized representatives of OWNER, INSPECTOR, ARCHITECT, CONTRACTOR, and other parties shall attend the meeting. All participants at the meeting shall be familiar with the Project and authorized to conclude matters relating to the Work.
- C. Agenda items shall include significant items which could affect progress of the Work, including, but not limited to the following:
  - 1. Preliminary Construction Schedule.
  - 2. Critical work sequencing.
  - 3. Designation of responsible personnel.
  - 4. Identification of Owner.

**SECTION 01 3119  
PROJECT MEETINGS**

5. Procedures for processing field decisions.
6. Request for Proposal.
7. Request for Clarification.
8. Construction Directive and Change Order.
9. Procedures for processing Applications for Payment.
10. Prevailing wages.
11. Submittal and review of Shop Drawings, Product Data, material lists, and Samples.
12. Preparation of project record documents.
13. Use of the Project site and/or premises.
14. Parking availability.
15. Office, work, and storage areas.
16. Equipment deliveries and priorities.
17. Safety procedures.
18. First Aid.
19. Security.
20. Housekeeping.
21. Working hours.
22. Contract Compliance Officer.
23. Insurance Services including OCIP.
24. Environmental Health and Safety.
25. Substantial Completion, Administrative Closeout and Contract Completion requirements and procedures.
26. Procedures for Mandatory Dispute and Claim Resolution.
27. Storm Water Pollution Prevention Plan (SWPPP).
28. CEQA Compliance.

**SECTION 01 3119  
PROJECT MEETINGS**

- D. Owner shall prepare and issue meeting minutes to attendees and interested parties no later than five calendar days after the meeting date.

3.2 PRE-INSTALLATION CONFERENCES

- A. CONTRACTOR shall coordinate and conduct pre-installation conferences at the Project site as required by related Sections of the Contract Documents.

- B. CONTRACTOR, manufacturers, and fabricators involved in or affected by the installation and its coordination or integration with other pre-ceding and/or subsequent installations of Work shall attend the meeting. CONTRACTOR shall advise Owner, INSPECTOR, and ARCHITECT of scheduled meeting dates in order to secure their attendance.

- 1. CONTRACTOR shall review the progress of construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for the following:

- a. Contract Documents.
- b. Options.
- c. Related Construction Directives and Change Orders.
- d. Purchases.
- e. Deliveries.
- f. Shop Drawings, Product Data, and quality-control samples.
- g. Review of mockups.
- h. Possible conflicts.
- i. Compatibility problems.
- j. Time schedules.
- k. Weather limitations.
- l. Manufacturer's recommendations.
- m. Warranty requirements.
- n. Compatibility of materials.
- o. Acceptability of substrates.
- p. Temporary facilities.

**SECTION 01 3119  
PROJECT MEETINGS**

- q. Space and access limitations.
  - r. Governing regulations.
  - s. Safety.
  - t. Inspecting and testing requirements.
  - u. Required performance results.
  - v. Recording requirements.
  - w. Protection.
2. CONTRACTOR shall record significant discussions and directives received from each conference. CONTRACTOR shall, within three (3) calendar days after the meeting date, distribute the minutes of the meeting to all concerned parties, including but not limited to, Owner, INSPECTOR, and ARCHITECT.

**3.3 PROGRESS MEETINGS**

- A. Progress meetings will be held at the Project site at regular intervals, typically weekly, as determined by the Owner.
- B. In addition to representatives of CONTRACTOR, OWNER, and ARCHITECT, each Subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of the Work shall, if requested by Owner, be represented at these meetings. All participants at the conference shall be familiar with the Project and authorized to conclude all matters relating to the Work.
- C. Failure of CONTRACTOR to be so represented at any progress meeting which is held at a mutually agreed time or for which a written notice is given, shall not relieve CONTRACTOR from abiding by any and all Owner determinations or directives issued at such meeting.
- D. Owner will review and correct or approve minutes of the previous progress meeting and will review other significant items affecting progress. Topics for discussion as appropriate to the status of the Project include but are not limited to:
  - 1. Interface requirements.
  - 2. Construction Schedule.
  - 3. Sequence and coordination.
  - 4. Status of submittals / RFCs.
  - 5. Deliveries.

**SECTION 01 3119  
PROJECT MEETINGS**

6. Off-site fabrication.
  7. Access.
  8. Site utilization.
  9. Temporary Construction Facilities and Controls.
  10. Hours of work.
  11. Hazards and risks.
  12. Housekeeping.
  13. Quality of materials, fabrication, and execution.
  14. Unforeseen conditions.
  15. Testing and Inspection.
  16. Defective Work.
  17. Construction Directive.
  18. Request for Proposal.
  19. Change Order Proposals and Change Orders.
  20. Documentation of information for payment requests.
  21. Application for Payment.
  22. Other items as required or as brought forth.
  23. Initial Notice of Start of Issue, Event, Condition, Circumstance, or Cause of Perceived Delay, Disruption, Interference, Hindrance, Acceleration. (Article 12.2.1 of the General Conditions).
  24. Final Notice of End of Issue, Event, Condition, Circumstance, or Cause of Perceived Delay, Disruption, Interference, Hindrance, Acceleration (Article 12.2.2 of the General Conditions).
  25. Storm Water Pollution Prevention.
  26. CEQA Compliance.
- E. No later than three (3) calendar days after each progress meeting, Owner will prepare and distribute minutes of the meeting to each present and absent party.

**SECTION 01 3119  
PROJECT MEETINGS**

Include a brief summary, in narrative form, of progress, decisions, directives, actions taken, and all other issues since the previous meeting and report.

1. Schedule Updating: CONTRACTOR shall revise the Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized and issue the revised schedule at the next scheduled progress meeting.

3.4 ADDITIONAL MEETINGS

- A. Owner, upon giving notice to the intended parties and without further obligation, may require additional meetings to discuss Work and/or Project related activities.

3.5 OWNER'S RIGHT TO RECORD

- A. CONTRACTOR agrees on behalf of itself and all its subcontractors that the OWNER may audiotape or videotape any meetings, training, and any work at any time during the Project

END OF SECTION

**SECTION 01 3300  
SUBMITTAL PROCEDURES**

**PART 1 - GENERAL**

**1.1 Schedule of Submittals**

- A. Within 30 days 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 sample, shop drawings, catalog cut, and so forth) and include the scheduled dates of submittal. In preparing the schedule, adequate time (16 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.
  
- B. Within 30 days after receiving a Notice to Proceed, the Contractor must complete and submit to the Engineer a listing of all subcontractors, including subcontractor's name, address, telephone number, fax number, and email address. Include an updated list with each progress payment request.
  
- 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

**SECTION 01 3300  
SUBMITTAL PROCEDURES**

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

## SECTION 01 3300 SUBMITTAL PROCEDURES

if, after tests are performed on selected samples, the material is found not to meet the specific requirements.

### 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 of 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 attached Schedule of Values. When applicable, a separate cost breakdown form must be submitted for each separate building. However, the total cost of site work and building facility must be included in the cost estimate breakdown. The number of items provided on the Systems Construction Cost Estimate Breakdown form are the minimum required. Additional subdivision of these items may be used by the Contractor.

**SECTION 01 3300  
SUBMITTAL PROCEDURES**

- B. Submit the construction cost breakdown after contract award to the Engineer.
  - 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.
- 1.8 As-built plans.
- A. Contractor to submit as built plans.
  - B. During construction, maintain as-built redline drawings for all drawings and final as-builds for contractor-generated coordination drawings. Update after completion of commissioning.

PART 2 - PRODUCTS - N/A

PART 3 - EXECUTION - N/A

3.1 PROCEDURE

- A. Timing of Submittals:
  - 1. In accordance with General Conditions, CONTRACTOR shall submit to ARCHITECT, with copy of transmittal to the Owner, those Shop Drawings, Product Data, diagrams, materials lists, Samples, and other submittals required by the Contract Documents.
  - 2. The scheduling of submittals shall be sequenced to support the progress of the Work, and shall be:
    - a. Submitted sufficiently in advance of construction, fabrication, or installation in order to allow time for transmittal, review, modification, correction, (and resubmission and re-review when required.)
    - b. Phased with adequate time between submittals in order to allow for proper review by the ARCHITECT without negative impact to the Milestones Schedule.
  - 3. CONTRACTOR shall coordinate submittal of related items and ARCHITECT reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received by ARCHITECT.
  - 4. CONTRACTOR shall revise, update, and submit submittal schedule to ARCHITECT and Owner on the first of each month, or as required by Owner.

**SECTION 01 3300  
SUBMITTAL PROCEDURES**

5. CONTRACTOR shall allow in the Construction Schedule at least sixteen working days for ARCHITECT review following ARCHITECT receipt of submittal. For mechanical, plumbing, electrical, low voltage, fire sprinklers, door and hardware, and other submittals requiring joint review with Owner, CONTRACTOR shall allow a minimum of eighteen days following ARCHITECT receipt of submittal. Deferred approval items shall be allowed additional time for City / District agencies review.
6. No adjustments to the Contract Time or Milestones will be authorized because of a failure to transmit submittals to ARCHITECT sufficiently in advance of the Work to permit review and processing or where CONTRACTOR fails to provide ARCHITECT submittals on related items.
7. In case of product substitution, Shop Drawing preparation shall not commence until such time as OWNER accepts or rejects the proposed substitution in accordance with the procedures described in the General Conditions.

END OF SECTION

**SECTION 01 3543  
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 as a result 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 enough 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. Plans must be approved by the Engineer 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 City recycling code and 1.4 (B) below.

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**ENVIRONMENTAL PROCEDURES**

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 City'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 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, in excess of one percent as defined by US Environmental Protection Agency regulations, is prohibited in the construction of this project. Provide an executed copy of the "Certificate of

**SECTION 01 3543**  
**ENVIRONMENTAL PROCEDURES**

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 - N/A

PART 3 - EXECUTION - N/A

END OF SECTION

**SECTION 01 3543  
ENVIRONMENTAL PROCEDURES**

**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 City requirement listed in this table.

<b>Issue</b>	<b>City 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><i>Proper Work Practices:</i> 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>	<p>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 City Engineer (CE) or City Engineer's representative (CER).</p>
<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 City 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>	<p>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.</p>
<b>Elevated Work and Fall Protection</b>	<p>Follow strictly the applicable OSHA fall protection requirements.</p>
<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 City 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 City 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>	<p>Inform the Engineer before any chemicals are used. Before materials are brought on site, provide material safety data sheets (MSDSs) and an 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 capacity.</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 City 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 City has not authorized it, (b) in</p>

**SECTION 01 3543  
ENVIRONMENTAL PROCEDURES**

	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.
<b>Powered Industrial Trucks</b>	Powered industrial trucks and other mobile equipment must follow all traffic rules of the City 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. As a rule, the City does not allow gas- or diesel-powered industrial equipment inside City facilities. Coordinate exceptions to the rule through the City safety office.
<b>Ladders</b>	Strictly follow all OSHA requirements regarding ladders. Barricade the ladder use area to prevent contact with mobile equipment and employees.
<b>Lead-Based Paint</b>	<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. <i>Proper Work Practices:</i> If LBP is present, follow proper control procedures and work practices. <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.
<b>Lockout/Tagout</b>	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 City lockout/tagout program. If you encounter a City 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 plan to have the lockout device removed in accordance with City lockout removal policies.
<b>Personal Protective Equipment</b>	Before beginning work, evaluate the work area for hazards, determine whether contract employees will be required to use personal protective equipment (PPE) to protect themselves from these hazards, and document the hazard assessment. Wear the PPE required regardless of your perception of hazard potential.
<b>Regulated and Prohibited Materials</b>	<i>Pesticides.</i> The City has restricted the use of pesticides. Obtain prior approval of the City 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 City 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 City facilities. <i>Lead.</i> Apply no lead-based paint in City facilities.
<b>Scaffolding</b>	Follow strictly the applicable OSHA scaffolding requirements. Provide adequate barrier protection around the scaffolding to prevent hazards to City staff.
<b>Walking and Working Surfaces</b>	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 communicated these to all employees.

**SECTION 01 3543  
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 City evacuation procedures.            - Immediately contact the nearest City employee and inform him or her of the fire. You may also activate an emergency alarm in the area. If no City 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 City evacuation procedures.            - Immediately contact the designated City representative and inform him or her of the release. You may also activate an emergency alarm in the area. If no City 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 City 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>

**SECTION 01 3543  
ENVIRONMENTAL PROCEDURES**

**Certificate of Asbestos and Lead-Based Paint  
(New Work)**

To: District Engineer

Subject: Certification for new construction

District facility name: \_\_\_\_\_

District facility address: \_\_\_\_\_

**Certification for new construction:**

This Contractor/Owner hereby certifies that no asbestos-containing material in excess of 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 01 4000  
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, manufacturers, 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 01 4000  
QUALITY REQUIREMENTS**

- E. Perform work by persons who are thoroughly qualified and trained in their respective trade, to produce workmanship of specified quality.

1.4 Contractor Field Inspection and Testing

- A. Contractor: Test and Inspect work provided under this Contract to ensure work follows compliance with Contract requirements. Required tests and inspections are indicated in each individual Specification Section and shall be performed as required by the City 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. Quality of workmanship.
  - 2. Review for omissions or dimensional errors.
  - 3. Examination of products used, connections and supports.
  - 4. 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.

1.5 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

1.6 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.

**SECTION 01 4000  
QUALITY REQUIREMENTS**

- 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.

1.7 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.

1.8 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 N/A

PART 3 – EXECUTION N/A

END OF SECTION

**SECTION 01 5000  
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 District will provide water from the existing services required for construction under this project and will pay all costs in connection with them.

**1.4 Temporary Electricity**

- A. Service Required: The District 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 in order 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 01 5000  
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 so as 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 Temporary Water
- A. The District will provide and maintain a temporary water supply system for building purposes.
- 1.6 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.
- 1.7 Approaches and Exits
- A. The Contractor must provide all necessary approaches and exits required to properly execute the work.

PART 2 - PRODUCTS - N/A

PART 3 - EXECUTION - N/A

END OF SECTION

**SECTION 01 6000  
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.
- C. For exterior storage of fabricated Products, place on sloped supports, above ground.

**SECTION 01 6000  
PRODUCT REQUIREMENTS**

- 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 01 7300 EXECUTION

### PART 1 - GENERAL

#### 1.1 Layout of Work

- A. The Contractor must lay out its work to match existing or from City-established base lines and benchmarks as indicated on the drawings. The Contractor shall be responsible for all measurements based on them. 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 from the base lines and benchmarks established by the City. The Contractor is responsible for the execution of the work to those lines and grades established or indicated by the Engineer.

#### 1.2 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.

#### 1.3 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.

##### 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 petrochemical spills, stains, and other foreign deposits.

## SECTION 01 7300 EXECUTION

- 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-surfaced 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. Broom clean concrete floors in unoccupied spaces.
  - e. 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.
  - f. Remove labels that are not permanent labels.
  - g. 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.
  - h. 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.
  - i. 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 District property, store these materials as directed by the Engineer.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

**SECTION 01 7329  
CUTTING AND PATCHING**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. This Section specifies procedural requirements for cutting and patching.

**1.2 RELATED REQUIREMENTS**

- A. Section 01 3300 - Submittal Procedures.
- B. Section 01 7419 – Construction and Demolition Waste Management
- C. Section 01 7836 - Warranties.

**1.3 DEFINITIONS**

- A. Cutting. The word “cutting” as used in the Contract Documents includes, but is not limited to, cutting, drilling, chopping, and other similar operations and the word “patching” includes, but is not limited to, patching, rebuilding, reinforcing, repairing, refurbishing, restoring, replacing, or other similar operations.

**1.4 SUBMITTALS**

- A. Cutting and Patching Proposal: CONTRACTOR shall submit a proposal to PROJECT MANAGER as is required, describing procedures well in advance of the time cutting and patching will be performed if the Contract Documents requires approval of these procedures before proceeding. Include the following information, as applicable, in the proposal:
  - 1. Describe the extent of cutting and patching required. Denote how it will be performed and indicate why it cannot be avoided.
  - 2. Describe anticipated results in terms of changes to existing construction. Include changes to structural elements and operating components as well as changes in the building’s appearance or other significant visual elements.
  - 3. Utilities: List utilities that cutting and patching operations will disturb or affect. List utilities to be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
  - 4. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the original structure.

**SECTION 01 7329  
CUTTING AND PATCHING**

5. Review by ARCHITECT and City Building Department prior to proceeding with cutting and patching does not waive ARCHITECT right to later require complete removal and replacement of defective Work. Cutting and patching shall be reviewed by the ARCHITECT and the City Building Department if a structural elements are to remain.

1.5 QUALITY ASSURANCE

- A. Requirements for structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio. If the load carrying member is meant to be supported as part of the new Work, then the supporting members should be part of the City Building Department approved design. If shoring of a structural element is required to be cut and patched, then the CONTRACTOR is required to provide a City Building Department approved design.

1. Obtain approval from ARCHITECT and City Building Department of the cutting and patching proposal before cutting and patching the following structural elements:

- a. Foundation construction.
- b. Bearing and retaining walls.
- c. Structural concrete.
- d. Structural steel.
- e. Lintels.
- f. Timber and primary wood framing.
- g. Structural decking.
- i. Miscellaneous structural metals.
- k. Equipment supports.

- B. Operational Limitations: Do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased maintenance or decreased operational life or safety.

1. Obtain review of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:

- a. Primary operational systems and equipment.

**SECTION 01 7329  
CUTTING AND PATCHING**

- b. Air or smoke barriers.
  - c. Water, moisture, or vapor barriers.
  - d. Membranes and flashings.
  - e. Fire protection systems.
  - f. Noise and vibration control elements and systems.
  - g. Control systems.
  - h. Communication and/or data systems.
  - j. Electrical wiring systems.
- C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the opinion of ARCHITECT, reduce the building's aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

1.6 WARRANTY

- A. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

PART 2 - PRODUCTS - N/A

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action before proceeding.
  - 1. Before proceeding, meet at the Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.2 PREPARATION

- A. Temporary support: Provide adequate temporary support of existing improvements or Work to be cut.

**SECTION 01 7329  
CUTTING AND PATCHING**

- B. Protection: Protect existing improvements and Work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of existing improvements or Work that might be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Where the Work requires sandblasting of existing surfaces in order to receive new materials secured by cementitious, adhesive or chemical bond, completely remove existing finishes, stains, oil, grease, bitumen, mastic and adhesives or other substances deleterious to the new bonding or fastening of new Work. Utilize wet sand blasting for interior surfaces and for exterior surfaces where necessary to prevent objectionable production of dust.

**3.3 PERFORMANCE**

- A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay. Carefully remove existing Work to be salvaged and/or reinstalled. Protect and store for reuse into the Work. Verify compatibility and suitability of existing substrates before starting the Work.
- B. Cutting: Cut existing construction using methods least likely to damage elements retained or adjoining Work. Where possible, review proposed procedures with the original installer; comply with the original installer's recommendations.
  - 1. In general, where cutting, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Cut through concrete and masonry using a cutting machine, such as a carborundum saw or a diamond-core drill. Saw cut reinforcing bars and paint ends with bituminous paint except where bonded into new concrete or masonry.
  - 4. Woodwork: Cut and remove it to a panel or joint line.
  - 5. Sheet Metal: Remove back to joint, lap, or connection. Secure loose or unfastened ends or edges and seal watertight.
  - 6. Plaster: Cut back to sound plaster on straight lines, and back bevel edges of remaining plaster. Trim existing lath and prepare for new lath.

**SECTION 01 7329  
CUTTING AND PATCHING**

7. Gypsum Wallboard: Cut back on straight lines to undamaged surfaces with at least two opposite cut edges centered on supports.
  8. Flooring: Completely remove flooring and clean backing of prior adhesive. Carefully remove flooring for patching and repairing of existing tile flooring scheduled to remain.
- C. Patching: Patch with durable seams that are as invisible as possible. Comply with required tolerances.
1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation. Verify conditions of existing substrates prior to executing Work.
  2. Restore exposed finishes of patched areas and extend finish restoration into retaining adjoining construction in a manner that will eliminate all evidence of patching and refinishing.
  3. Concrete: Maintain cut edges in a moist condition for twenty-four hours prior to the placement of new concrete. In lieu of this an epoxy adhesive may be provided. Finish placed concrete to match existing unless noted otherwise. Concrete shall have a compressive strength of 3,000 psi where installed to repair and match existing improvements, unless noted otherwise.
  4. Metal Fabrications: Items to remain exposed shall have their edges cut and ground smooth and rounded.
  5. Sheet Metal: Replace removed or damaged sheet metal items for new Work.
  6. Lath and Plaster: Install new lath materials to match existing and fasten to supports at 6-inch centers. Provide a 6-inch lap where new lath to adjoins existing lath. Fasten new lath as required for new Work. Restore paper backings as required. Apply a bonding agent on cut edges of existing plaster. Apply three coat plaster of the type, thickness, finish, texture, and color to match existing.
  7. Gypsum Wallboard: Fasten cut edges of wallboard. Install patches with at least two opposite edges centered on supports and secure at 6-inch centers. Tape and finish joints and fastener heads. Patching shall be non-apparent when painted or finished.
  8. Resilient Flooring: Completely remove flooring and prepare substrate for new material.
  9. Painting: Prepare areas to be patched, patch and paint as specified under related sections of the Contract Documents.

**SECTION 01 7329  
CUTTING AND PATCHING**

3.4 CLEANING

- A. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar items. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged coverings to their original condition.
- B. Comply with waste disposal requirements in Section 01 7419 "Construction and Demolition Waste Management."

END OF SECTION

**SECTION 01 7419  
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 District 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 City Ordinances.
  
- C. Related Sections:
  - 1. Section 01 4000 - Quality Requirements: Contractor's Daily Report.
  - 2. Section 01 5000 - Temporary Facilities and Controls: Temporary ventilation, progress cleaning, and waste removal.
  - 3. Section 01 6000 - Product Requirements: Substitutions.
  - 4. Section 02 4116 - Demolition.

**1.2 DEFINITIONS**

- A. Adequate ventilation: Ventilation, including air circulation and air changes, required to cure materials, dissipate humidity, and prevent accumulation of dust fumes, vapors, or gases.
  
- B. Construction and demolition waste: Include 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.
  
- C. Chemical waste: Includes petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.

**SECTION 01 7419**  
**CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

- 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 City recycling code.
  - 2. Revise and resubmit Solid Waste Management and Environmental Protection Plan as required by the City.
    - a. Approval of the Contractor's Solid Waste Management and Environmental Protection Plan will not relieve the Contractor of responsibility for adequate

**SECTION 01 7419  
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

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 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 on form in Appendix B of this Section.

**PART 2 PRODUCTS - N/A**

**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. Concrete.
  - 2. Metal.
    - a. Ferrous.
    - b. Non-ferrous.
  - 3. Wood.
  - 4. Debris.
  - 5. Paper/Cardboard.
  - 6. Plastic.
  - 7. Gypsum.
  - 8. Paint.
  - 9. Others as appropriate.
  
- B. Recycling/reuse centers: Contact governmental solid waste offices, Environmental Protection Agency (EPA) regional offices, and applicable non-profit organizations.
  - 1. Concrete.
  - 2. Metal.
    - a. Ferrous.
    - b. Non-ferrous.
  - 3. Wood.

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CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

4. Debris.
5. Paper/Cardboard.
6. Plastic.
7. Gypsum.
8. Paint.
9. Others as appropriate.

C. Handling:

1. Clean materials which are contaminated prior to placing them 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, which 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 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:

**SECTION 01 7419**  
**CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

- 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 site, 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 wastes.
  - 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, top soil, and landforms without permission from The District.
4. Air Resources: Prevent the 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 in accordance with The City approved Solid Waste Management and Environmental Protection Plan.
6. 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 City & District 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 01 7419  
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>	<b>Date Material Disposed/ Diverted</b>	<b>Amount Disposed/ Diverted (ton or cu.yd)</b>	<b>Municipal Solid Waste Facility (name, address, &amp; phone number)</b>	<b>Recycling/Reuse Facility (name, address, &amp; phone number)</b>	<b>Comments (if disposed, state why not diverted)</b>
Concrete					
Metal					
Wood					
Debris					
Paper/ Cardboard					
Plastic					
Gypsum					
Paint					
Other:					

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

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

**SECTION 01 7419  
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. Fly Ash:

1. Total dollar amount of concrete and cement provided for this project.  
\$\_\_\_\_\_.
2. Total dollar amount of concrete and cement containing fly ash provided for this project. \$\_\_\_\_\_.
3. Were there any technical impediments to increasing the amount of concrete and cement containing fly ash provided for this project? \_\_\_\_\_.
  - a. If yes, please explain. \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_.

B. Floor Tiles (ceramic):

1. Total dollar amount of floor tile (ceramic) 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

**SECTION 01 7419  
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

3.0 SOLID WASTE PREVENTION

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

4.0 RECYCLING

- A. 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.)     \$\_\_\_\_\_.
- 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: \_\_\_\_\_

**SECTION 01 7704**  
**CLOSEOUT PROCEDURES AND TRAINING**

**PART 1 - GENERAL**

**1.1 Manuals**

- A. Purpose: Operation and maintenance manuals are for the training of and use by District 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 where applicable:
1. Doors & Windows.
  2. Lighting & Controls.
  3. Plumbing Systems.
  4. Miscellaneous building equipment and systems.
- B. Content: Unless otherwise indicated, each chapter must contain the following, as applicable:
1. Introduction.
  2. Table of contents.
  3. Description of system (including design intent and considerations).
- C. Preparation: The outline below is intended as a general guide for preparing the manuals. The manuals must be prepared to provide for the optimum operation and maintenance of the various systems. The description of systems and general operating instructions for plumbing and electrical manuals may cover only complicated or unusual parts of these systems, such as sewage ejectors, transformers, high tension switchgear, and signal and alarm systems. Manufacturer's literature and data must be those of the actual equipment installed under contract for the facility. Further guidance is available in the ASHRAE Handbook, 1984, Systems Volume, Chapter 39, Mechanical Maintenance.
- D. Suggested Outline for Operation and Maintenance (O&M) Manuals: This is a suggested outline, with general requirements of O&M manuals. The outline is presented to indicate the extent of material to be covered and the individual items required in manuals for major facilities. The outline may be modified to suit specific installations; however, the purpose of the manual must be fulfilled. The manual is not intended to duplicate manufacturers' data, but proper references must be made in the text of the O&M manual to indicate that that information is applicable and where it is located.
1. Part I. Description and Design Intent
    - a. Introduction
      - 1) Provide a brief description of project and purpose of the maintenance manual. The following statements must be included: "Operation and maintenance of this equipment must be performed in accordance with this manual and posted instructions, subject to compliance with applicable technical guides and standards issued by the District. It is recognized that minor changes in control points and settings will be required, based on actual operating experience, to correct varying conditions and improve operation. When such changes appear

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necessary, they must be submitted to the maintenance manager for consideration. Upon approval of any changes, the applicable portions of all copies of the manual and proposed instructions must be revised and reissued, and any change in operating procedure brought to the attention of all operating personnel."

- 2) "This manual is specifically developed to assist the District official in charge at the facility to operate and maintain the building systems and equipment. Manufacturers' recommendations set forth for certain components must be followed during the complete warranty period for that equipment."
  - 3) Contents of Manual. This portion of the introduction must explain that the manual is to contain complete operating, maintenance, and safety instructions for all equipment listed. It must also contain any other appropriate references as required to outline an explanation of the manuals and major categories of reference material required with the manuals.
- b. Table of Contents
- 1) The table of contents must list numbers and titles of chapters, sections, and main paragraphs, with their page numbers. Each volume in a set of manuals must contain its own table of contents. Publications containing 10 or more illustrations or tables must include a list of illustrations or tables, as applicable. These lists must show number, title, and page number of each illustration and table. Following is a typical table of contents:
    - a. Doors
      - 1.) Specialized hardware
    - b. Electrical Systems
      - 1.) Incoming Service
      - 2.) Electrical power distribution
      - 3.) Lighting and lighting controls
    - c. Miscellaneous Building Equipment
2. Part II. Operating Sequence and Procedures
- a. Contents: Each chapter must describe the procedures necessary for District personnel to operate the system and equipment covered in that chapter.
  - b. Operating Procedures:
    - 1) Startup: Give complete instructions for energizing the equipment and making initial settings and adjustments whenever applicable.
    - 2) Operation: Give detailed instructions in proper sequence for each mode of operation.
    - 3) Emergency Operation: If some functions of the equipment can be operated while other functions are disabled, give instructions for operations under these conditions.

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- 4) Shutdown: Include instructions for stopping and securing the equipment after operation. If a sequence is required, give step-by-step instructions in that order.

3. Part III. Maintenance Instructions and Requirements

- a. Contents: Each chapter must describe the procedures necessary for District personnel to perform the maintenance on the systems and equipment covered in that chapter. Emphasis must be placed on the method of mechanical control of systems and equipment from a maintenance standpoint.
- b. Manufacturers' Brochures: Include manufacturers' descriptive literature covering devices used in the system, together with illustrations, exploded views, and renewal parts lists. This section must also include special devices manufactured by the Contractor.
- c. Special Maintenance: Provide information of a maintenance nature covering warranty items that have not been discussed elsewhere.
- d. Warranty: Include a copy of the "special" or extended warranty in the operation and maintenance manual.

E. Submittal, In both "hard" and electronic flash drive format:

1. Preliminary Submittal: Two draft copies of the completed manuscript for items in this outline must be submitted to the project manager 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, 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. Wiring Diagrams.
5. Shop Drawings and Product Data.
6. Fixture Lamping schedule.
7. Signed Asbestos and Lead-Based Paint Certificate.

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8. Survey Report.
9. Material Safety Data Sheets
10. Signed and sealed Contractor Release of Claims.

PART 2 - PRODUCTS - N/A

PART 3 - EXECUTION - N/A

END OF SECTION

## SECTION 01 7836 WARRANTIES

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. This Section includes administrative and procedural requirements for warranties, including manufacturers and installers' standard warranties on products and special product warranties.
  - 1. Refer to the General Conditions for terms of the guarantee period for the Work.

#### 1.2 RELATED REQUIREMENTS

- A. Section 01 6000 - Product Requirements.
- B. Section 01 7329 - Cutting and Patching.
- C. Section 01 7704 – Closeout Procedures and Training.

### PART 2 - PRODUCTS - N/A

### PART 3 - EXECUTION

#### 3.1 WARRANTY REQUIREMENTS

- A. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties shall not relieve CONTACTOR of the warranty of the Work incorporating such materials, products, and equipment. Manufacturer's disclaimers and limitations on warranties do not relieve suppliers, manufacturers, installers, and Subcontractors of the requirement to countersign special warranties with CONTRACTOR.
- B. Standard warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to OWNER.
- C. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for OWNER.
- D. Related Damages and Losses: When correcting failed or defective warranted Work, remove and replace Work that has been damaged as a result of such failure or which must be removed and replaced to provide access for correction of warranted Work.

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WARRANTIES**

- E. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement with the reinstated warranty equal to the original warranty.
- F. Replacement Cost: Upon determination the Work covered by a warranty has failed and/or is defective, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. CONTRACTOR is responsible for the cost of replacing or rebuilding defective Work regardless of whether OWNER has benefited from use of the Work through a portion of its anticipated useful service life.
- G. OWNER Recourse: Expressed warranties made to OWNER are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which OWNER can enforce such other duties, obligations, rights, or remedies.
- H. Rejection of Warranties: The Project Engineer reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
- I. Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, Project Engineer reserves the right to refuse to accept the Work until CONTRACTOR presents evidence the entities required to countersign such commitments have done so.

3.2 SUBMITTALS

- A. Submit written preliminary warranties prior to Substantial Completion and final warranties prior to Contract Completion. If the certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, submit written warranties as set forth in the certificate of Substantial Completion.
  - 1. When a designated portion of the Work is partially used and/or occupied by OWNER, submit properly executed warranties to ARCHITECT within fifteen days of the Partial Use or Occupancy of the designated portion of the Work.
- B. When the Contract Documents require CONTRACTOR, or CONTRACTOR and a Subcontractor, installer, supplier or manufacturer to execute a special warranty, prepare a written document containing appropriate terms and identification, ready for execution by the required parties. Submit a draft to Project Engineer, through the ARCHITECT, for approval prior to final execution.
  - 1. Refer to Divisions 02 through 49 for specific content requirements and particular requirements for submitting special warranties.

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WARRANTIES**

- C. Form of Submittal: Prior to Contract Completion, compile two copies of each required final warranty properly executed by CONTRACTOR, or by CONTRACTOR and Subcontractor, installer, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the Specifications.
- D. Bind warranties and bonds in heavy-duty, commercial-quality, durable three ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8½ by 11 paper.
  - 1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the item or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the installer.
  - 2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title and/or name, and name of CONTRACTOR.
  - 3. When warranted Work requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

END OF SECTION

**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, 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 01 3543 - 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 Contractor shall be responsible for removing all materials and kitchen equipment which the District wishes to salvage prior to the beginning of this Work and securely storing them. Contractor to verify during the pre-construction meeting for equipment that is owned by the district and equipment owned by the Baseball little league and for which equipment to salvage.

**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.

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**SELECTIVE STRUCTURE DEMOLITION**

2. Operational and Safety Limitations: Do not cut operational elements and safety-related components in a manner resulting in a reduction of capacities to perform in a manner intended or resulting in 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, 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 District 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 District. Salvaged items must be transported from the site as they are removed.
- F. Protection: Make sure that the safe passage of persons around the area of demolition is maintained during the demolition operation. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.

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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 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 jack-hammers or explosives.

**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 District.
- 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 District.

**2.2 SALVAGED MATERIALS**

- A. Removed and salvaged materials of value not designated for reinstallation, unless claimed as salvage by the District, 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 01 3543- Environmental Procedures.

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SELECTIVE STRUCTURE DEMOLITION**

- B. The District will remove or, under separate contract, have all materials and equipment which the District 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 District.

**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 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 District.

**3.2 PREPARATION**

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

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**SELECTIVE STRUCTURE DEMOLITION**

- 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 finish 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 Section 01 3543 - 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 specified in Section 01 3543 - Environmental Procedures and as approved by the County in the Solid Waste Management and Environmental Protection Plan.

**3.6 SCHEDULE OF SELECTIVE 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 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 finish floor.
- C. Electrical Service:

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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.
- D. Provide additional selective demolition as indicated and required by the Contract Documents and as required for indicated new construction.
- E. Items for demolition covered under the plans and these specifications include wood bench, roll-up door, cove base, floor tile, plumbing features, concrete slab saw cut, cap utilities, remove interior partition walls, built-in counters, some doors, electrical lighting, toilet partitions, metal screen at roof, selective demolition, and as shown on drawings.
- F. Payment for items of work covered in the plans and Division 2 specification will be based on the lump sum bid price for building demolition and removals, no additional compensation will be allowed.

END OF SECTION

**SECTION 03 1000  
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 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; Supply of concrete accessories for placement by this section:
  - 1. Section 03 2000 – Concrete Reinforcement.
  - 2. Section 03 3000 – Cast-In-Place Concrete.

**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 01 3300 - 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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- B. Where necessary, design formwork under direct supervision of a Professional Engineer experienced in design of formwork and licensed in State where Project is located at no additional cost to the District.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 6000 - 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 tight fit.
- C. Lumber: Construction grade; with grade stamp clearly visible.

**2.2 PREFABRICATED FORMS**

- 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.

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- 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.
- D. Forms for Textured Finish Concrete: Units of face design, size, arrangement, and configuration to match the control sample. Provide solid backing and form supports to ensure stability of textured form liners.

**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, or 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 01 60 00 - Product Requirements: Product options and substitutions.
- C. Corners: Chamfered, wood strip 3/4x3/4-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.

**SECTION 03 1000  
CONCRETE FORMING AND ACCESSORIES**

**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, 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 District.

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

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CONCRETE FORMING AND ACCESSORIES**

**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 water stops in accordance with manufacturer's published instructions continuous without displacing reinforcement. Seal joints watertight.

**3.6 FORM CLEANING**

- 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.

**SECTION 03 1000  
CONCRETE FORMING AND ACCESSORIES**

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 01 40 00 - 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

**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 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 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.

**1.3 SUBMITTALS**

- A. Submittal Procedures:
  - 1. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel [and wire fabric, bending and cutting schedules, and supporting

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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.

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.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Resource Management
  1. Recycled Content
    - a. Steel Products: Post-consumer recycled content plus one half of pre-consumer recycled content not less than 75 percent.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Reinforcing Steel: ASTM A 706, 60 ksi yield grade; deformed billet steel bars, unfinished.
- 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.

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- G. Welding electrodes: AWS D1.4-11, Table 5.1 and Table 5.3, low hydrogen electrodes, E8018 for A706 Grade 60 steel.
- H. Reinforcing Bar size: As noted per plan.

**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 the Engineer.

**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, 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 District.

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**3.2 PLACEMENT**

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- 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 01 4000 - Quality Requirements: Field inspection.
- B. Inspect reinforcing locations, bar types and sizes, wire ties, and welding (if applicable).

END OF SECTION

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**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 foundations, foundation walls, slabs-on-grade.
  2. Finishing of concrete 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.
  5. Non-shrink grout including installation and forming.
  6. Testing related services.
- 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 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. Where a date is given for reference standards, the edition of that date shall be used. Where no date is given for reference standards, the latest edition available on the date of Notice Inviting Bids shall be used.
- B. American Association of State Highway and Transportation Officials (AASHTO).
1. AASHTO M182, "Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats."
- C. 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."

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3. ACI 212.2R, "Guide for Use of Admixtures in Concrete."
4. ACI 302.1R, "Guide for Concrete Floor and Slab Construction."
5. ACI 304R, "Guide for Measuring, Mixing, Transporting, and Placing Concrete."
6. ACI 304.2-R, "Placing Concrete by Pumping Methods."
7. ACI 305, "Hot Weather Concreting."
8. ACI 306, "Cold Weather Concreting."
9. ACI 306.1 "Standard Specification for Cold Weather Concreting."
10. ACI 308, "Standard Practice for Curing Concrete."
11. ACI 309R, "Guide for Consolidation for Concrete."
12. ACI 315, "Details and Detailing of Concrete Reinforcement."
13. ACI 347, "Guide to Formwork for Concrete."
14. ACI SP-15, "Field Reference Manual" which includes ACI 301 "Specifications for Structural Concrete for Buildings" and reference standards specified therein.

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 C33, "Standard Specification for Concrete Aggregates."
3. ASTM C39, "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens."
4. ASTM C94, "Standard Specification for Ready-Mixed Concrete."
5. ASTM C150, "Standard Specification for Portland Cement."
6. ASTM C156, "Standard Test Method for Water Retention by Concrete Curing Materials."

E. Concrete Reinforcing Steel Institute (CRSI),

1. CRSI "Manual of Standard Practice."

1.3 SUBMITTALS

A. Submittal Procedures:

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.

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- 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:
    - 1) Procedure for mixing and transporting concrete to the point of placement.
    - 2) Procedures for placement of concrete.
    - 3) Methods of obtaining and maintaining the required concrete temperature during placement and initial curing.
    - 4) Procedures for consolidating the concrete.
    - 5) Procedures 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 4000 - 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:

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- a. Copies of delivery tickets for each load of concrete delivered to site.
  - b. Indicate information on each ticket 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 Testing Laboratory same day as concrete delivery.
7. Verification Samples:
- a. At exposed concrete location provide a sample of concrete with medium broom finish and sealed for Engineer's approval.
- B. Closeout Procedures and Training:
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."
  2. Extra Products: Submit extra products as specified in this Section.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 6000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Deliver materials in unopened containers with labels identifying contents.
- C. Store powdered materials in dry area and in 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.

**1.6 ENVIRONMENTAL REQUIREMENTS**

- A. Environmental Impact:
  1. Concrete placement accessories:
    - a. Mixing equipment: Return excess concrete to supplier; minimize water used to wash equipment.

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**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
- B. Product Requirements: Product options and substitutions: Permitted.

**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 I 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.
- 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.

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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.
  
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

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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 to Table 1A shall apply. The amount retained on the 325 sieve in 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 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 assure 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.

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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 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 of 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.

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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. Exterior Sealers: applied to horizontal concrete surfaces permanently exposed to salts, deicer chemicals, and moisture, including parking decks. The manufacturer shall provide a five-year labor and materials warranty on performance of the sealer. Sealer shall be compatible with the curing compound used.

1. Euclid: Eucoguard or Diamond Clear or Super Diamond Clear.
2. ChemREX: Hydrozo Clear 40.
3. Or approved equal.

D. 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)
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 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

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preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing and inspection unless otherwise acceptable to the Engineer.

- B. Submit written reports to the testing laboratory of each proposed mix for each concrete class at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed and approved. Include the following information for each concrete mix design:
1. Method used to determine the proposed mix design.
  2. Gradation of fine and coarse aggregates, plus combined aggregate gradation for slabs, ACI 302.1R.
  3. Aggregate specific gravities and absorptions.
  4. Proportions of all ingredients including reported on a saturated surface dried basis all admixtures added either at the time of batching or at the job site.
  5. Water-cementitious ratio.
  6. Slump, ASTM C143.
  7. Certification of the chloride content of individual admixtures and of the mixes as proposed.
  8. Air Content: ASTM C173 (Volumetric Method).
  9. Unit weight of concrete, ASTM C138.
  10. Strength at 3, 7, and 28 days, ASTM C39.
  11. Method of recording batch proportions.
  12. Substantiating test reports.
- C. Concrete types and strengths: Minimum 28 Day Compressive Strength shall be per design requirements but not less than:
1. Paving base, columns, beams, walls, foundations, and footings: 3,500 psi.
  2. Slab-on-grade: 3,500 psi.
  3. All concrete exposed to weather shall be air entrained (ASTM C260).
  4. All concrete shall be normal weight except as noted above.

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.

- D. Weights: All concrete shall be normal-weight concrete unless otherwise designated on the structural drawings.

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- E. 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.
- F. 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.
- G. Slump: Conform to ACI 301.
1. 3 ½ inch maximum for consolidation by vibration
  2. 5 inch maximum for consolidation by other methods
  3. 8 inch maximum for flowable concrete. Concrete containing HRWR admixture (super plasticizer): 3 inch maximum before addition of HRWR
  4. Where field conditions require slump to exceed that specified above, the increased slump shall be obtained by the use of a superplasticizer only, and the Contractor shall obtain written approval from the Engineer who may require an adjustment to the mix.
- H. Slab-On-Grade
1. Concrete shall conform to ACI 302.1R except that the minimum 28-day compressive strength shall be 3,500 psi.
  2. The minimum cementitious content shall be in accordance with ACI 302.1R Table 6.2.
  3. The maximum water-cementitious ratio shall be 0.48.
  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.
- I. 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

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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.
  - d. The concrete producer shall furnish duplicate delivery tickets, one for the Contractor and one given to the District'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.

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- 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 should 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 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

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- 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 to require 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 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 District inspector.
  23. No water shall be added to concrete except with the approval of the District 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 District. Laboratory test data for revised mix design and strength results must be submitted and accepted before using in work.

2.6 FORMWORK

- A. Section 03 1000: Concrete Forming and Accessories

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2.7 REINFORCING MATERIALS

- A. Section 03 2000: Concrete Reinforcement

PART 3 - EXECUTION

3.1 EXAMINATION

- A. 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 District.

3.2 INSTALLATION - GENERAL

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

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- G. Forms and the reinforcement shall be thoroughly cleaned of ice and other coatings. Remove surplus form releasing agent from the contact face of forms.
- H. Notify all trades concerned and the District's Representative sufficiently in advance of the scheduled time for concrete placement to permit installation of all required work by other trades.
- I. Before placing concrete, all required embedded items, including dovetail anchor slots, anchors, inserts, curb angles, metal frames, fixtures, sleeves, drains, stair nosing's, accessory devices for Mechanical and Electrical installations shall be properly located, accurately positioned and built into the construction, and maintained securely in place.
- J. Build into construction all items furnished by the District and other trades. Provide all offsets, pockets, slabs, chases, and recesses as job conditions require.
- K. Place and properly support reinforcing steel and anchor bolts.
- L. The alignment, orientation, spacing, and embedment length of mechanical load transfer devices in slab-on-grade and pavements shall conform to dimensions and tolerances shown on the drawings.
- M. The Engineer and District Inspector shall be notified when the first concrete pour is scheduled.

**3.3 INSTALLATION - FORMWORK**

- A. Section 03 1000 - Concrete Forming and Accessories
- B. Construction and Contraction Joints: Conform to ACI 301 and recommendations of ACI 302.1R.

**3.4 REINFORCEMENT**

- A. Placement: Section 03 2000 - Concrete Reinforcement

**3.5 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.

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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.
4. Placing of concrete will not be permitted during rainfall or when rain appears imminently. If rain should fall subsequent to placement, the concrete shall be completely protected until curing is complete.
5. Cold-Weather Placement: Comply with provisions of ACI 306.1 "Standard Specifications for Cold-Weather Concreting" and as follows.
  - a. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
  - b. When necessary, arrangements for heating, covering, insulating, or housing the concrete work shall be made in advance of placement and shall be adequate to maintain the required temperature during the first 24 hours.
  - c. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
  - d. Concrete shall not be placed on frozen ground or placed when the ambient temperature is 40 deg F or less and dropping.
  - e. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  - f. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures using vented heaters and insulating blankets.
  - g. Vent heater exhaust gases that contain carbon dioxide outside of enclosed areas.
  - h. Concrete temperatures shall be maintained above 50 degrees F for the first 7 days of curing.
6. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305R "Standard Specification for Hot-Weather Concreting" and as specified.
  - a. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice of a size that will melt completely during mixing may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  - b. Reject any concrete that has a temperature at the point of placement above 90 deg F, unless approved otherwise by the Engineer. When air temperatures are between 80 and 90 deg F the maximum mixing and delivery time is reduced to 75 minutes. When air temperatures exceed 90 deg F, the maximum mixing and delivery time is reduced to 60 minutes.
  - c. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
  - d. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.

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- e. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to the Engineer.
- f. Spray evaporative retardants, wind breaks, misters, or shade concrete when the rate of surface evaporation when calculated in accordance with ACI 305.5 exceeds 0.2 lb./sq. foot per hour.

**B. Depositing Concrete**

- 1. Deposit concrete as near its final position as possible to avoid segregation due to re-handling or flowing. Hoppers, tremies, pump line, ducts, chutes, or other methods approved by the Engineer shall be used to deposit concrete 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.
- 4. Concrete shall be deposited as nearly as practical in its final position to avoid segregation due to re-handling or flowing. No concrete shall have a free fall of over three feet from truck, mixer, or buggies.
- 5. The concreting shall be carried on at such a rate that the concrete is plastic at all times and flows readily into the spaces between reinforcing bars. No concrete that has partially hardened or been contaminated by foreign materials shall be deposited in the work
- 6. When concreting is started, it shall be carried on as a continuous operation until the placing of the section is completed.
- 7. Except as intercepted by joints, concrete shall be placed in continuous layers. The depth of layers shall not exceed 20 inches. Succeeding layers shall be placed while the previous layer is still plastic. Concrete placement shall begin at the lowest point in each section of concrete to be placed.
- 8. Protect adjacent surfaces from concrete drippings, spillage, and splashes. Hardened or partially hardened splashes or accumulations of concrete on forms or reinforcement shall be removed before the work proceeds. Clean all damaged surfaces immediately.
- 9. All conveyances shall be thoroughly cleaned at frequent intervals during the placement of the concrete, and before the beginning a new run of concrete all hardened concrete and foreign materials shall be removed from the surfaces.
- 10. The Superintendent or Foreman in charge of concrete work shall mark on the drawings the time and date of the placing of each concrete pour. Locations where concrete test cylinders are made shall also be noted on the drawings. Such drawings shall be kept on file at the job until their completion and shall be subject to the inspection of the Engineer at all times.

**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.

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3. Chutes longer than 50 feet and conveyor belts longer than 110 feet will not be permitted.
4. Equipment for conveying and chuting concrete shall be of such size and design as to insure a practically continuous flow of concrete at the delivery point without separation of material.
5. Provide runways or other means for wheeled equipment to convey concrete to point of deposit. Construct runways so that supports will not bear upon reinforcement or fresh concrete.
6. The minimum slope of chutes shall enable concrete of the specified consistency to readily flow.
7. Ends of chutes, hopper gates, and other points of concrete discharge throughout the conveying, hoisting, and placing system shall be designed and arranged so that concrete passing from them will not fall separated into whatever receptacle immediately receiving the concrete. Adequate headroom provision must be made at such points for a vertical drop and for proper baffling.
8. If a conveyor belt is used, it shall be wiped clean by a device operated so that none of the mortar adhering to the belt will be wasted.

**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.
2. During pumping, the Contractor shall have on-site a standby placing system, acceptable to the Engineer, to ensure that in the event of breakdown of the primary placing equipment, the concrete placement can continue without cold joints.
3. The minimum diameter of the hose or conduit shall be 4 inches unless otherwise approved by the Engineer. Aluminum conduits shall not be used for conveying the concrete. Pumping equipment, hoses, and conduits that are not functioning properly shall be replaced.

**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 and concrete pavement shall conform to that shown on the pour sequencing plan and/or drawings.
  - 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.

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- c. Joint spacing 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. Joints in slabs shall align with joints in adjoining walls unless otherwise approved by the Engineer or shown in the drawings. Joints shall also line up with architectural reveals and form lines. All corners shall be relieved by cutting joint to adjacent control joint.
- 6. When not otherwise shown on the drawings or specified, concrete placement for walls shall be constructed in segments no longer than 30 feet unless otherwise approved by the Engineer.
- 7. 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.
- 8. 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.
- 9. 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.
- 10. Corner sections of walls shall not be placed until the adjoining wall sections have cured at least 14 days.

**F. Consolidation**

- 1. All concrete shall be thoroughly consolidated by internal mechanical vibrators during the placing operation and shall be thoroughly worked around the reinforcement and embedded fixtures and into corners of the forms.

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2. 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.
  3. Concrete shall be consolidated by vibration to the maximum practicable density. The concrete shall be free from pockets of coarse aggregate and entrapped air.
  4. Vibrators shall have a minimum diameter of 3 inches with a frequency of at least 7000 vibrations per minute and with an amplitude adequate to consolidate the concrete in the section being placed.
  5. Forms shall contain sufficient windows or shall be limited in height to allow visual observation of the concrete during placement. Sufficient illumination shall be provided in the interior of forms so that at the places of concrete deposition the concrete shall be visible from the deck or runway.
  6. Vibrators shall not be secured to forms or reinforcement.
  7. Keep a minimum of two standby vibrators in operable condition on the job during concreting operations.
  8. Consolidation shall be carried on continuously with the placing of concrete.
  9. The number of vibrators employed shall be sufficient to consolidate the concrete within 15 minutes after it is deposited in the forms.
  10. When consolidating each layer of concrete, the vibrator shall be operated at regular and frequent intervals 18 to 30 inches apart.
  11. The vibrator shall be kept in nearly a vertical position as possible. The use of vibrators to shift or drag concrete after deposition will not be permitted. Vibrators shall not be laid horizontally or laid over.
  12. The vibrator head shall penetrate 6 to 8 inches into the preceding layer and then be withdrawn at a slow rate. The top part of each layer shall be re-vibrated systematically at the latest time the concrete can be made plastic by means of vibration.
  13. Concrete shall not be placed until the previous layer has been vibrated.
  14. Unless directed otherwise by the Engineer, the top 2 feet of walls shall be re-vibrated approximately 1 hour after placement of concrete and while a running vibrator will still sink under its own weight into the concrete and liquefy it momentarily.
- G. Protection of cast concrete: Conform to ACI 301.
- H. 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 solidly 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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**3.6 FINISHING**

- A. Finishing of formed surfaces: ACI 301:
1. Tops of forms:
    - a. Strike concrete smooth at tops of forms.
    - b. Float to texture comparable to formed surfaces.
  2. Formed surfaces:
    - a. Finished formed surfaces shall conform accurately to the shape, alignment, grades, and sections shown on the drawings or prescribed by the Engineer.
    - b. Surfaces shall be free from fins, bulges, ridges, honeycombing, or roughness of any kind and shall present a finished, smooth, continuous hard surface.
    - c. Permanently exposed surfaces: ACI 301 - "Smooth Form Finish" with the fins ground smooth and air holes shall be filled with a non-shrink mortar. The color of the patch material shall match the color of the surrounding concrete. Surfaces in unfinished areas unexposed to public view: ACI 301- "Rough Form Finish".
- B. 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) Use of a Fresno.
      - 5) Addition of water to the surface during the finishing operation.
      - 6) 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 bleed water is present on the surface.

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- 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 ¼ inch.
- c. 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.
- d. Exterior Concrete Finishes: Unless otherwise noted on the drawings, floors and walkways shall be sloped a minimum 0.125 inch per foot to drain water. A light steel trowel with medium broom finish unless otherwise noted on the plans. Apply exterior sealer to surfaces exposed to deicer chemicals that is compatible with the curing method used.
- e. Exposed Ramps, Landings and Stair Treads: A light steel trowel with medium broom finish unless otherwise noted on the plans. Surfaces shall be sealed or sealed and hardened using a liquid compound compatible with the curing method used.
- f. A heavy broom finish shall be provided on disabled person ramps.

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

**A. Temperature, Wind, and Humidity**

1. When concrete slabs and other unformed concrete is placed in warm, dry, dusty, or windy conditions, concrete surfaces shall be protected from rapid drying by use of windbreaks, shading, fogging with professionally designed nozzles, or a combination of these measures. Hot weather concreting procedures provided in ACI 305R shall be used when ambient conditions dictate.
2. Cold weather concreting procedures provided in ACI 306R shall be used when ambient conditions dictate.
3. Changes in air temperature immediately adjacent to the concrete during and immediately following the 7-day initial curing period shall be kept as uniform as possible and shall not exceed 5 deg. F in any 1 hour or 50 deg. F. in any 24-hour time period.

**B. Curing Compound**

1. All curing methods must be placed immediately after final finishing (i.e., within two hours). 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

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

**C. Protection**

1. Freshly placed concrete must be protected against wash by rain.
2. Dust control shall be provided in the surrounding areas during placement. If, in the opinion of the Engineer, these conditions are not satisfactory met, concrete shall not be placed.
3. During the first 2-day period of curing, no traffic on or loading of the floors will be permitted.
4. 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.
5. Special care shall be taken to prevent avoid 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.
6. Precautions shall be taken to prevent overloading floors, pavements, slabs, beams, and other members. The Contractor shall comply with the Engineer's instructions regarding the loads that will be permitted on these members during construction.
7. Self-supporting structures shall not be loaded in such a way to overstress the concrete.

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**3.8 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 this is not formed as shown on the drawings.
  - 2. Concrete this 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 District Engineer for each individual area. Should the District 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.
  
- 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.
  
- F. If approved by the Engineer, repair or replace concrete with excessive honeycombing due to improper placement.
  - 1. Honeycombed areas shall be removed down to solid concrete a minimum of 1 inch over the entire area. Feathered edges will not be permitted. If chipping is necessary, the edges shall be perpendicular to the surface or slightly undercut.
  - 2. Laitance and soft material shall be removed prior to patching with a pea gravel concrete mix and bonding agent approved by the Engineer.
  - 3. The area to be patched and an area at least 6 inches wide surrounding it shall be dampened to prevent absorption of water from the patching materials.
  - 4. If a cement slurry bonding grout is approved, the heavy-cream consistency grout shall then be rigorously brushed into the surface. The concrete patch material shall be installed prior to the bonding grout skimming over or drying.
  - 5. If approved, a bonding admixture, bonding compound, or epoxy adhesive may be used in strict accordance with the manufacturer's preparation and application recommendations. Comply with ACI 301 and ACI 503.2 for standard specifications

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for bonding plastic concrete to hardened concrete with a multiple component epoxy adhesive.

6. The repair concrete shall be thoroughly consolidated in place and struck off so as to leave the patch slightly higher than the surrounding surface. The concrete shall be left undisturbed for at least 1 hour to permit initial shrinkage then finished.
7. The patched area shall be kept damp for 7 days.
8. The color of the patch material shall match the color of the surrounding concrete. Repairs shall be made promptly while the base concrete is less than 28 days old
9. Metal tools shall not be used in finishing a patch in a formed wall that will be exposed.

G. Areas requiring patching shall not exceed 2 sq. ft. per 1000 sq. ft. of surface area and shall be widely dispersed. Areas showing excessive defects as determined by the Engineer shall be removed and replaced.

H. High spots identified in the floor flatness and levelness survey may be removed with bump grinding. Areas to be ground shall not exceed more than 10 percent of any one slab nor more than 5 percent of the total slab-on-grade area. There are no limitations for exterior concrete pavement areas requiring grinding.

I. If approved by the Engineer, concrete slab random cracking may be routed and sealed. The number of interior/exterior slabs to be routed and sealed shall not exceed more than 20 feet of any one slab nor more than 5 percent of the total number of slab-on-grade/pavement slabs. Slabs with more than one structural crack or with multiple cracks within a slab shall be removed and replaced. If random cracks are attributed to non-working sawcut control joints, uncracked joints parallel to the cracking shall be filled with a structural epoxy.

J. Interior slab-on-grade subjected to lift truck traffic shall be routed and sealed with a semi-rigid epoxy sealant. Exterior slabs may be routed and sealed with the flexible joint sealant to be installed in pavement joints.

K. 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 District Engineer. In this event, modifications may be required to assure that remaining work complies with the requirements.

L. 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.

### 3.9 FIELD QUALITY CONTROL

A. Quality Requirements: Field testing and inspection.

B. Requirements:

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1. Provide and maintain an adequate program of quality control for the materials, production methods, and workmanship to assure conformance of all work to the project contract documents. ACI 121R outlines the essential elements of the Material Control portion of the QA program.
2. All materials, equipment, and methods shall be subject to verification inspections and/or testing as specified herein; ACI 121R.

END OF SECTION

**SECTION 04 0514**  
**MASONRY MORTARING AND GROUTING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Mortar and for unit masonry.
  - 2. Grout for unit masonry.
  
- B. Related Sections:
  - 1. Section 04 2200 - Concrete Unit Masonry: Installation of mortar and grout, reinforcement, and anchorages.

**1.2 REFERENCES**

- A. American Society for Testing and Materials (ASTM):
  - 1. ASTM C 94 - Specification for Ready-Mixed Concrete.
  - 2. ASTM C 143 - Test Method for Slump of Hydraulic Cement Concrete.
  - 3. ASTM C 144 - Specification for Aggregate for Masonry Mortar.
  - 4. ASTM C 150 - Specification for Portland Cement.
  - 5. ASTM C 207 - Specification for Hydrated Lime for Masonry Purposes.
  - 6. ASTM C 270 - Specification for Mortar for Unit Masonry.
  - 7. ASTM C 387 - Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.
  - 8. ASTM C 404 - Specification for Aggregates for Masonry Grout.
  - 9. ASTM C 476 - Specification for Grout for Masonry.
  - 10. ASTM C 1019 - Method of Sampling and Testing Grout.
  - 11. ASTM C 1142 - Specification for Extended Life Mortar for Unit Masonry.
  - 12. ASTM C 90 – Standard Specifications for Load Bearing Concrete
  
- B. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

**1.3 SUBMITTALS**

- A. Section 01 3300 - Submittal Procedures: Procedures for submittals.
  - 1. Samples: Submit two samples 3-inch x 3 inch in size illustrating mortar color and color range.
  - 2. Assurance/Control Submittals:
    - a. Design Data: Design mix in accordance with the Proportion specification of ASTM C 270 and required environmental conditions.
    - b. Test Reports: Submit the following reports directly to Engineer from Testing Laboratory, with copy to Contractor. Prepare reports in conformance with Section 01 4000 - Quality Requirements.

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MASONRY MORTARING AND GROUTING**

- 1) Conformance to Proportion specification of ASTM C 270.
- 2) Test and evaluation reports to ASTM C 780.
- c. Certificates: Submit manufacturer's certificate that Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Company experienced in performing the Work of this Section.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Section 01 6000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Store sand for mortar on plastic sheeting to prevent contamination by extraneous chemicals in earth beneath.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements:
  1. Cold Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.
  2. Specific Cold Weather Requirements: When the ambient air temperature is below 40 degrees F, heat mixing water to maintain mortar temperature between 40 degrees F and 120 degrees F until placed. When the ambient air temperature is below 32 degrees F, heat the sand and water to maintain this mortar temperature.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portland Cement: ASTM C 150, normal-Type I or Type II; gray color. Fly ash, slag, and pozzolans not permitted as substitutes for Portland cement.
- B. Mortar Aggregate: ASTM C 144, standard masonry type; clean, dry, protected against dampness, freezing, and foreign matter.
- C. Grout Aggregate: ASTM C 404; use of blast furnace slag is not permitted. Maximum coarse aggregate size, 3/8 inch.
- D. Calcium chloride is not permitted in mortar or grout. Admixtures or other chemicals containing Thiocyanates, Calcium Chloride or more than 0.1 percent chloride ions are not permitted.

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- E. Hydrated Lime: ASTM C 207, Type S.
- F. Water: Potable.
- G. Admixtures: Not permitted unless approved by Engineer prior to construction.

**2.2 MIXES - MORTAR**

- A. Mortar: Type "N" or Type "S", as recommended by manufacturer, in accordance with the Proportion specification of ASTM C 270.
  - 1. Mixing of components on-site is acceptable.
  - 2. Mixing on-site water and packaged dry blended mix for mortar (ASTM C 387), that contains no masonry cement, is acceptable.
- B. Pointing Mortar: Duplicate original mortar proportions. Add aluminum tristearate, calcium stearate, or ammonium stearate equal to 2 Percent of Portland cement weight.
- C. Mortar Color: Match Existing

**2.3 MIXING - MORTAR**

- A. Thoroughly mix mortar ingredients in accordance with ASTM C 270, in quantities needed for immediate use.
  - 1. Maintain sand uniformly damp immediately before the mixing process.
  - 2. Provide uniformity of mix and coloration.
  - 3. Do not use anti-freeze compounds.
  - 4. If water is lost by evaporation, re-temper only within 2 hours of mixing. Do not re-temper mortar more than 2 hours after mixing.

**2.4 MIXES - GROUT FILL**

- A. Grout fill is for concrete masonry unit bond beams, lintels, and reinforced cells with reinforcing bars and embedded plates.
  - 1. Compressive Strength: 2000 psi minimum at 28 days, as determined in accordance with the provisions of ASTM C 1019.
  - 2. Slump: 8 inches, minimum; 10 inches, maximum, taken in accordance with ASTM C 143.
  - 3. Use coarse grout when grout space is equal to or greater than 4 inches in both directions.
  - 4. Use fine grout when grout space is smaller than 4 inches in either direction.
  - 5. Do not use air-entrainment admixtures.

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MASONRY MORTARING AND GROUTING**

2.5 MIXING - GROUT

- A. Grout: Batch and mix grout in accordance with ASTM C 94 or ASTM C476 for site batched and mixed grout. Do not use anti-freeze compounds to lower the freezing point of grout.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. After reinforcing of masonry is securely tied in place, plug cleanout holes with masonry units. Brace against wet grout pressure.
- B. Install mortar and grout under provisions of Section 04 2200 – Concrete Unit Masonry.

END OF SECTION

**SECTION 04 2200  
CONCRETE UNIT MASONRY**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Concrete unit masonry veneer.
  
- 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 04 0514 - Masonry Mortaring and Grouting: Mortar and grout.

**1.2 REFERENCES**

- A. American Concrete Institute (ACI):
  - 1. ACI 530 - Building Code Requirements for Masonry Structures.
  - 2. ACI 530.1 - Specifications for Masonry Structures.
  
- B. American Society for Testing and Materials (ASTM):
  - 1. ASTM A 615 - Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
  - 2. ASTM C 55 - Specification for Concrete Brick.
  - 3. ASTM C 129 - Specification for Non-Load Bearing Concrete Masonry Units.
  
- C. International Masonry Industry All- Weather Council (IMIAC): Recommended Practices and Guide Specifications for Cold Weather Masonry construction.

**1.3 SUBMITTALS**

- A. Section 01 3300 - Submittal Procedures: Procedures for submittals.
  - 1. Product Data: Data for each masonry unit type, accessory, and other manufactured products indicated.
  - 2. Shop Drawings: Precast inserts and keys showing sizes, profiles, and locations of each precast unit required.
  - 3. Samples: Two samples of each masonry unit type to illustrate color, texture, and extremes of color range.
  - 4. Assurance/Control Submittals:
    - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.

**SECTION 04 2200  
CONCRETE UNIT MASONRY**

5. Submit layout of control joint placement for the Engineer's approval prior to starting any work.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 530 and ACI 530.1.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 6000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Materials shall be delivered and stored so as to avoid damage from breakage, moisture, staining, or damage of any kind.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements:
  1. Cold Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.
  2. Hot Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Hot Weather Masonry Construction.

**PART 2 - PRODUCTS**

2.1 CONCRETE MASONRY UNITS

- A. Lightweight units used for non-load bearing walls, meeting requirements of ASTM C129, Type I. Provide units meeting fire resistance ratings.
- B. Lightweight units used for load bearing walls, meeting requirements of ASTM C90, Grade N, Type I. Provide units meeting fire resistance ratings.
- C. Units to be high precision block or glazed. Sizes and colors as designated on Plans.
- D. Special shaped units, U-blocks, etc., shall meet same specifications as adjacent units.
- E. Concrete masonry veneer units shall match existing Concrete Masonry Units in size, texture, and color.

2.2 MORTAR

- A. Specified in Section 04 0514 – Masonry Mortaring and Grouting.

2.3 REINFORCING

**SECTION 04 2200  
CONCRETE UNIT MASONRY**

- A. Horizontal reinforcing for concrete masonry units shall be mill galvanized, ladder type with 9-gauge parallel wires in each face and 9-gauge cross members a maximum of 24 inches on center, butt welded to side rods. Provide prefabricated corners and tees.
- B. Reinforcing bars for lintels shall meet ASTM A615, Grade 60.

**2.4 CONTROL JOINTS**

- A. Joint filler shall be pre-formed neoprene or poly-vinyl chloride.
- B. Control joint placement in non-reinforced masonry:
  - 1. Vertical control joints shall generally be located:
    - a. At major changes in wall height.
    - b. At changes in wall thickness.
    - c. At control joints in foundations, in roof, and in floors.
    - d. At chases and recesses for piping, columns, fixtures, etc.
    - e. At one or both sides of wall openings.
    - f. Near wall intersections.
    - g. Near return angles in L, T, and U-shaped structures.
  - 2. Maximum spacing of control joints shall be in no case exceed 24 feet or as otherwise indicated on the Plans.

**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 about 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 District.

**3.2 PREPARATION**

- A. Provide temporary bracing during installation of masonry Work. Maintain in place until building structure provides permanent bracing.
- B. Lay out work to avoid use of less than 8-inch x 8-inch faced units at jambs in exposed work.

**SECTION 04 2200  
CONCRETE UNIT MASONRY**

- C. Lintel block shall extend into side walls at jambs, at least 8 inches.

**3.3 INSTALLATION**

- A. CMU Base Drainage Course: Lay base drainage course of CMU, consisting of 2 wythes separated by a cavity sized to accommodate through-wall flashing and mesh.
- B. Mortar shall be thoroughly mixed and kept moist but shall not be re-tempered for use after initial set.
- C. Lay only dry masonry units.
- D. Use masonry saw for cutting exposed surfaces. Cut units to provide 1/8-inch clearance around electrical boxes and similar items.
- E. Do not use chipped, cracked, or broken units.
- F. Set units plumb, true to line, and level.
- G. Adjust units to final position while mortar is soft and plastic. If unit is displaced after mortar has stiffened, remove unit, clean joints and unit of mortar and reset with fresh mortar.
- H. When joining fresh work to set or partially set masonry clean exposed surface and remove loose mortar before laying fresh masonry.
- I. When necessary to stop a horizontal, run rack back one-half block length in each course, do not tooth.
- J. Unless indicated otherwise partitions shall extend from floor to bottom of floor or roof construction above.
- K. Where rated partitions run perpendicular to deck, fill voids at deck with grout.

**3.4 BOND**

- A. Lay units in running bond with vertical joints centered on unit in course below unless indicated otherwise on drawings.

**3.5 MORTAR BEDS**

- A. Lay hollow units with full mortar coverage on horizontal and vertical face shells. Provide full mortar coverage on horizontal and vertical face shells and webs where adjacent to cells or cavities to be filled with grout and on starting courses.
- B. Lay block with full horizontal and vertical joints.

**SECTION 04 2200  
CONCRETE UNIT MASONRY**

**3.6 WIRE REINFORCEMENT**

- A. Wire Reinforcements shall be placed as follows:
  - 1. Four-inch concrete block walls with ends adjoining other partitions
    - a. Concrete block on slab on grade – continuous horizontal reinforcements 24 inches on center vertically (every third course).
    - b. Concrete block on slabs above grade - Continuous horizontal reinforcement 16 inches on center vertically (every other course).
  - 2. Eight-inch concrete block walls
    - a. Concrete block walls on slab on grade - continuous horizontal reinforcement 16-inches on center vertically (every other course).
    - b. Concrete block walls on slabs above grade - continuous horizontal reinforcements 24-inches on center vertically (every third course).
  - 3. Wire reinforcement shall be completely embedded in mortar or grout. Joints with wire reinforcement shall be at least the thickness of the wire.
  - 4. Wire reinforcement shall be lapped at least 8 inches at splices and shall contain at least one cross wire of each piece of reinforcement in the lapped distance.

**3.7 JOINTS**

- A. Nominal thickness shall be 3/8 inch (9 mm) and uniform.
- B. Shove vertical joints tight.
- C. Strike joints flush in surfaces to be exposed or painted.
- D. Tool joints slightly concave in surfaces to be exposed or painted.

**3.8 BUILT-UP WORK**

- A. Cooperate with other trades in building in items in masonry work.
- B. Grout shall be solid and placed around built-in elements and frames.

**3.9 CLEANING AND POINTING**

- A. Dry brush masonry surfaces after mortar has set at end of each day's work and after final points.
- B. Cut out and repoint defective joints.
- C. At final completion of masonry work fill holes in joints and tool to match adjacent work. Cut out and repoint defective joints.
- D. Leave work and surrounding surfaces clean and free of mortar spots and droppings.

**3.10 MASONRY JOINT REINFORCEMENT, TIES, AND ANCHORS**

**SECTION 04 2200  
CONCRETE UNIT MASONRY**

- A. Embed joint reinforcement, ties, and anchors with minimum 5/8-inch cover to outside face.
- B. Place single wire joint reinforcement at maximum spacing of 18 inches on center vertically. Mechanically attach anchors to the joint reinforcement with clips or hooks.

3.11 CONTROL AND EXPANSION JOINTS

- A. Construct control joints as detailed in the drawings as masonry progresses.

END OF SECTION

**SECTION 05 5000  
METAL FABRICATIONS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
1. Square and Rectangular Metal Tubing
  2. Decorative Metal Fencing & Gates
  3. Metal Roof Vent
  4. Metal Louver System
  5. Metal Sheet
  6. Miscellaneous fabrications, as indicated on the Drawings.
- 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 A123, "Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products."
  2. ASTM A153, "Zinc Coating (Hot-Dip) on Iron and Steel Hardware."
  3. ASTM A307, "Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength."
  4. ASTM A568, "Specification for General Requirements for Steel Sheet, Carbon, and High-Strength, Low Alloy Hot-Rolled and Cold Rolled."
  5. ASTM A627, "Specification for Homogeneous Tool-Resisting Steel Bars for Security Applications."
  6. ASTM A780, "Practice for Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings."
- B. American Welding Society (AWS):
1. AWS D1.1 - Structural Welding Code.
- C. Steel Structures Painting Council Specification (SSPC):
1. Steel Structures Painting Manual.

**1.3 SUBMITTALS**

- A. Division 1 - Submittal Procedures: Procedures for submittals.
1. Product Data:
    - a. Submit complete descriptive data for all stock items.
  2. Shop Drawings:
    - a. Prepare Shop Drawings under seal of professional structural engineer registered in state where Project is located for products requiring structural engineering.

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METAL FABRICATIONS**

- b. Include profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners and accessories, erection drawings, elevations, welded connections using standard AWS welding symbol with net weld lengths.
- c. Take field measurements prior to preparation of shop drawings and fabrication when possible. Allow for trimming and fitting whenever taking of field measurements before fabrication might delay construction.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 6000 - Product Requirements: Transport, handle, store, and protect Products.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. Steel plates, angles, and other structural shapes shall conform to ASTM A36.
- B. Steel pipe shall conform to ASTM A53, Grade B, Schedule 40.
- C. Galvanized steel pipe and tube shall conform to ASTM A53.
- D. Steel Tubing shall conform to ASTM A500.
- E. Sheet Steel Galvanized: ASTM A446.
- F. Sheet and Strip Steel Hot Rolled: ASTM A568.
- G. Welding Materials: AWS D1.1; type required for materials being welded.
- H. Stainless Steel Sheet: ASTM A 240/A 240M, type 304 with #4 finish.
- I. Fasteners
  - 1. Bolts, Nuts and Washers for Exterior Locations: ASTM A307, galvanized in accordance with ASTM A153.
  - 2. Bolts, Nuts and Washers for Interior Locations: ASTM A307, Grade A, regular hexagon head.
  - 3. Bolts, Round Head: ANSI B-18.5
  - 4. Wood Screws, Flat Head Carbon Steel: ANSI B-18.6.1.
  - 5. Plain Washers, Helical Spring Type Carbon Steel: FS FF-W-84.
- J. Primers:
  - 1. Primer for Painting: One of following:
    - a. Tnemec, Kansas City, MO, (816) 474-3400: No. 99 red primer.
    - b. Chessman-Elliot Company: Ceco No. 15 Primox.

**SECTION 05 5000  
METAL FABRICATIONS**

- c. Rowe Products, Inc.: No. 7-C-19.
  - d. Section 01 60 00 – Product Requirements. Substitutions: Permitted.
2. Touch-Up Primer for Galvanized Surfaces: FS TT-P-641.

**2.2 FABRICATION**

- A. Fabricate steel items according to approved shop drawings and to applicable portions of AISC Specifications. Conceal welds where possible; grind exposed welds smooth and flush with adjacent finished surface. Ease exposed edges to small uniform radius.
- B. Pre-assemble products in shop to greatest extent possible. Disassemble units to extent necessary for shipping and handling. Clearly mark units for re-assemble and installation.
- C. For exposed to view fabrications, use materials which are smooth and free of surface blemishes including pitting, seams marks, roller marks, roller trade names, and roughness. Remove blemishes by grinding or by welding and grinding, prior to cleaning, treating and application of surface finishes including zinc coating.
- D. Fabricate items with joints tightly fitted and secured.
- E. Fit and shop assemble in largest practical sections for delivery to Project site.
- F. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of structure, except where specifically noted otherwise.
- G. Make exposed joints butt tight, flush and hairline.
- H. Fabricate anchorage and related components of same material and finish as metal fabrication, unless indicated otherwise.
- I. Galvanize miscellaneous framing and supports.

**2.3 ROUGH HARDWARE**

- A. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 sections.
- B. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

**SECTION 05 5000  
METAL FABRICATIONS**

**2.4 MISCELLANEOUS STEEL TRIM**

- A. Provide shapes and sizes indicated for profiles shown. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings, and anchorages as required for coordination of assembly and installation with other work.

**2.5 FINISHES, GENERAL**

- A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
- B. Finish metal fabrications after assembly.

**2.6 STEEL AND IRON FINISHES**

- A. Galvanizing: For those items indicated for galvanizing, apply zinc-coating by the hot-dip process compliance with the following requirements:
  - 1. ASTM A153 for galvanizing iron and steel hardware.
  - 2. ASTM A123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch thick and heavier.
- B. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
  - 1. Interiors (SSPC Zone 1A): SSPC-SP3 "Power Tool Cleaning":
- C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finish or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting.

**2.7 SHOP PAINTING AND PROTECTIVE COATING**

- A. Conform to Steel Structures Painting Council Specification 15-68T, Type 1, including preparation for painting.
- B. Hot-Dip galvanizing and zinc coatings applied on products fabricated from rolled, pressed, and forged steel shapes, plates, bars, and strips shall comply with ASTM Specification A123. Galvanized surfaces for which a shop coat of paint is specified shall be chemically treated to provide a bond for the paint. Except for bolts and nuts, all galvanizing shall be done after fabrication.

**SECTION 05 5000  
METAL FABRICATIONS**

- C. Clean surfaces of rust, scale, grease, and foreign matter in accordance with SSPC SP-1 solvent cleaning, prior to finishing. Prepare surfaces for painting in accordance with SSPC-SP2 Hand Tool Cleaning, SSPC-SP3 Power Tool Cleaning or SSPC SP-7 Brush Off Blast Cleaning.
- D. Do not prime surfaces in direct contact bond with concrete or where field welding is required.
- E. Prime paint items scheduled with one coat.
- F. Protect aluminum surfaces in contact with steel with zinc chromate primer.

**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 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 District.

**3.2 PREPARATION**

- A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

**3.3 FABRICATION**

- A. General:
  - 1. For fabrication of Work exposed to view, provide only materials smooth and free of blemishes. Remove blemishes by grinding or by welding and grinding, before cleaning, treating, and installation of surface finishes including zinc coatings.

**SECTION 05 5000  
METAL FABRICATIONS**

2. Eased exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated or specified.

B. Metal Roof Vent: Frames and wire mesh shall be shop fabricated and assembled from galvanized sheet metal of size and shape indicated on the drawings.

### 3.4 INSTALLATION

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.

D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of *exterior* units which have been hot dip galvanized after fabrication, and are intended for bolted or screwed field connections.

E. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

### 3.5 ADJUSTING AND CLEANING

A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touch-up of field painted surfaces.

1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

**SECTION 05 5000  
METAL FABRICATIONS**

- B. For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A780.

3.6 PROTECTION

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

END OF SECTION

**SECTION 06 1000  
ROUGH CARPENTRY**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Wood Framing.
  - 2. Concealed blocking behind wall mounted items.
  - 3. Sheathing material.
  - 4. Wood treatment.
  
- 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.

**1.2 REFERENCES**

- A. American Lumber Standards Committee (ALSC):
  - 1. Softwood Lumber Standards.
  
- B. American Plywood Association (APA):
  - 1. Grades and Standards.
  
- C. American Society for Testing and Materials (ASTM):
  - 1. ASTM A307 - Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
  - 2. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
  
- D. American Wood Preservers Association (AWPA):
  - 1. AWPA - C1 - All Timber Products - Preservative Treatment by Pressure Process.
  - 2. AWPA - C15 - Wood for Commercial-Residential Construction Preservative Treatment by Pressure Processes.
  - 3. AWPA - C20 - Structural Lumber - Fire-Retardant Treatment by Pressure Processes.
  - 4. AWPA - C27 - Plywood - Fire-Retardant Treatment by Pressure Processes.
  - 5. AWPA - P5 - Waterborne Preservatives.
  
- E. Underwriters' Laboratories, Inc. (UL):
  - 1. UL FR S - Fire Rated Treated Wood with Flame Spread and Smoke Developed Ratings of 25 or less in accordance with ASTM E84.
  - 2. UL 723 - Test for Surface Burning Characteristics of Building Materials.

**SECTION 06 1000  
ROUGH CARPENTRY**

**1.3 SUBMITTALS**

- A. Section 01 3300 - Submittal Procedures: Procedures for submittals.
  - 1. Assurance/Control Submittals:
    - a. Certificates:
      - 1) Pressure Treated Wood: Certification from treating plant stating chemicals and process used and net amount of preservative retained are in conformance with specified standards.
      - 2) Preservative Treated Wood: Certification for water-borne preservative that moisture content was reduced to 19 percent maximum, after treatment.
      - 3) Fire-Retardant Treated Wood: Certification from treating plant stating that fire-retardant treatment materials comply with governing code, ordinances and requirements of local authority having jurisdiction, and treatment will not bleed through finished surfaces.

**1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with the following agencies:
  - 1. Lumber Grading Agency: Certified by ALSC.
  - 2. Plywood Grading Agency: Certified by APA.
- B. Regulatory Requirements: Conform to applicable codes for fire-retardant treatment of wood surfaces for flame/smoke ratings.

**1.5 DELIVERY, STORAGE AND HANDLING**

- A. Section 01 6000 - Product Requirements: Transport, handle, store, and protect products.
  - 1. Inspect wood materials for conformance to specified grades, species, and treatment at time of delivery to Project Site.
  - 2. Reject and return unsatisfactory wood materials.
- B. Provide facilities for handling and storage of materials to prevent damage to edges, ends, and surfaces.
- C. Keep materials dry. Stack materials off ground minimum 12 inches or, if on concrete slab-on-grade, minimum 1-1/2 inches, fully protected from weather. Provide for air circulation within and around stacks and under temporary coverings.
- D. For materials pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

**SECTION 06 1000  
ROUGH CARPENTRY**

**1.6 ENVIRONMENTAL REQUIREMENTS**

- A. Environmental Impact:
1. Formaldehyde: Products containing urea-formaldehyde will not be permitted.
  2. Wood pressure treatment products: Products containing chromium will not be permitted. Products containing arsenic will not be permitted.
  3. Use exterior plywood only. Interior plywood is not permitted.

**PART 2 - PRODUCTS**

**2.1 LUMBER MATERIALS**

- A. Lumber, finished 4 sides, 15 percent maximum moisture content. Each piece of lumber to be factory marked with type, grade, mill, and grading agency.
1. Light framing: Construction grade Douglas fir or southern pine, appearance grade where exposed.
  2. Structural framing and timbers: No. 2 grade Douglas Fir, Southern Pine, or Spruce, appearance grade where exposed.
  3. Boards: Construction grade.

**2.2 NAILERS, BLOCKING, FURRING AND SLEEPERS**

- A. Wood for nailers, blocking, furring, and sleepers: Construction grade, finished 4 sides, 15 percent maximum moisture content. Pressure preservative treat items in contact with roofing, flashing, waterproofing, masonry, concrete, or the ground.

**2.3 BUILDING PAPER**

- A. Asphalt saturated felt, non-perforated.

**2.4 FASTENERS**

- A. Fasteners: Provide manufacturers with recommended power tools for each type of fastener.
1. Bolts, Nuts, Washers, Lag Screws, and Wood Screws: ASTM A307, Medium carbon steel; size and type to suit application; galvanized for treated wood; plain finish for other interior locations, of size and type to suit application, unless otherwise noted.
  2. Expansion Shield Fasteners: For anchorage of non-structural items to solid masonry and concrete.
  3. Powder or Pneumatically Activated Fasteners: For anchorage of non-structural items to steel.

**SECTION 06 1000  
ROUGH CARPENTRY**

4. Fasteners for Wood and Plywood (over 1/2 inch) to Light Gage Metal Framing and Metal Deck (up to 1/8 inch thick):
  - a. Hilti PWH #3 with wings.
  - b. ITW TEKS/4 with wings.
  - c. Or approved equal.
5. Fasteners for Wood and Plywood (up to 2 inches thick) to Metal (from 1/8 inch to 1/4 inch thick):
  - a. Hilti PFH #4 with wings.
  - b. ITW TEKS/4 with wings.
  - c. Or approved equal.
6. Fasteners for Non-Structural Wood Members to Masonry: 1/4-inch diameter x 3-1/4 inch with Philips flat head.
  - a. Tapcon masonry anchors, by ITW Buildex.
  - b. Kwik-Con II fastener, by Hilti.
  - c. Or approved equal
7. Fasteners for preservative treated lumber must be hot dipped galvanized, type 304 or 316 stainless steel, or zinc-polymer coated.

**2.5 WOOD TREATMENT**

- A. Preservative Pressure Treated Lumber, Alkaline Copper Quat (ACQ): Type B, Ammoniacal Copper Quat or Type D, Amine Copper Quat.
  1. Manufacturers:
    - a. Chemical Specialties, Incorporated,
    - b. Arch Wood Protection, Inc.,
    - c. Osmose Inc.,
    - d. Or approved equal.
  2. Products:
    - a. CSI: "Preserve."
    - b. Arch Wood: "Natural Select."
    - c. Osmose: "Nature Wood."
    - d. Or approved equal.
  3. Impregnate lumber with preservative treatment conforming to AWWA Standard C1 and P5. Apply the preservative in a closed cylinder by pressure process in accordance with AWWA Standard C15.
  4. Retention of preservative:
    - a. Moderate service conditions (weather exposure): 0.25 pounds per cubic foot (oxide basis).
    - b. Severe conditions (constant contact with ground or water): 0.40 pounds per cubic foot (oxide basis).
  5. Remove excess moisture where shrinkage is a serious fault or where treated lumber will be in contact with plaster, or stucco, and where water-borne treated lumber is to be painted or stained.
  6. Lumber shall be dried to 15 to 19 percent moisture content after treatment, and material to be painted or stained shall have knots and pitch streaks sealed as with untreated wood.

**SECTION 06 1000  
ROUGH CARPENTRY**

7. Liberally brush freshly cut surfaces, bolt holes, and machined areas with the same preservative in accordance with AWWPA Standard M4.
  8. Treatment material shall provide protection against termites and fungal decay and shall be registered for use as a wood preservative by the U. S. Environmental Protection Agency.
- B. Wood Requiring Treatment:
1. Lumber, Preservative Treated: Nailers, blocking, stripping, and similar items in conjunction with roofing, flashing, and other construction. Sills, blocking, furring, stripping, and similar items in contact with masonry or concrete.

**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.
  1. Verify that spacing, direction, and details of supports are correct to accommodate installation of blocking, backing, stripping, furring, and nailing strips.
- 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 District.

**3.2 INSTALLATION - FRAMING**

- A. Set structural members level and plumb, in correct position.
- B. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Place horizontal members, crown side up.
- D. Construct load bearing framing and curb members full length without splices.
- E. Double members at openings as indicated on Drawings. Space short studs over and under opening to stud spacing.

## SECTION 06 1000 ROUGH CARPENTRY

- F. Construct double joist headers at ceiling openings and under wall stud partitions that are parallel to roof trusses. Frame rigidly into roof trusses.
- G. Place full width continuous sill flashings under framed walls on cementitious foundations. Lap flashing joint 4 inches.
- H. Place sill gasket directly on sill flashing. Puncture gasket clean and fit tight to protruding foundation anchor bolts.
- I. Coordinate installation of wood decking and prefabricated wood trusses.
- J. Install miscellaneous blocking, nailing strips and framing where required as backing for attachment of wall mounted fixtures, cabinetwork, and other items, and as detailed on Drawings. Coordinate to allow proper attachment of work of other Sections.
  - 1. Secure in place using specified fasteners. Use only recommended power tools for placement of fasteners.
  - 2. Recess heads of fasteners below surface of wood members.
- K. Secure in place with appropriate fasteners. Use fasteners of correct size that will not penetrate members where opposite side will be exposed to view or require finishing. Do not split wood with fasteners; set panel products to allow expansion at joints.
- L. Construct members of continuous pieces of longest possible lengths.

### 3.3 SITE TREATMENT OF WOOD MATERIALS

- A. Apply preservative treatment in accordance with manufacturer's published instructions.
- B. Brush apply two coats of preservative treatment on wood in contact with cementitious materials and roofing and related metal flashings. Treat site-sawn cuts.
- C. Allow preservative to dry prior to erecting members.

### 3.4 CONSTRUCTION

- A. Site Tolerances:
  - 1. Framing Members: 1/4 inch from true position, maximum.

### 3.5 FIELD QUALITY CONTROL

- A. Section 01 4000 - Quality Requirements: Field inspection.
- B. Framing Inspection:

**SECTION 06 1000  
ROUGH CARPENTRY**

1. Inspect wood framing installation and connections at completion of each phase of wood construction for correct installation, nailing, connections, and fasteners.
2. Inspect and verify that types and spacing of fasteners are installed in locations specified or indicated on Drawings.
3. Inspect types, locations, and fasteners for structural metal framing connectors.
4. Inspect types, locations, and connections of hold-down anchors.
5. Inspect wood to steel beam connections.

3.6 SCHEDULE - NAILING

<u>CONNECTION</u>	<u>NAILING</u>
Joist to sill or girder, toenail	3 - 8d
Bridging to joist, toenail each end	2 - 8d
Bottom Plate to joist or blocking, face nail	16d at 16 inches o.c.
Top plate to stud, end nail	2-16d
Stud to bottom plate	4-8d, toenail or 2-16d, end nail
Double studs, face nail	16d at 24 inches o.c.
Double top plates, face nail	16d at 16 inches o.c.
Top plates, laps and intersections, face nail	2 - 16d
Continuous header, two pieces	16d at 16 inches o.c. along each edge
Ceiling joists to plate, toenail	3 - 8d
Continuous header to stud, toenail	4 - 8d
Ceiling joists, laps over partitions, face nail	3 - 16d
Ceiling joists to parallel rafters, face nail	3 - 16d
Rafter to plate, toenail	3 - 16d
Built-up corner studs	16d at 24 inches o.c.
Built-up beams	20d at 32 inches o.c. at top and bottom staggered 2 - 20d at ends and at each splice

Payment for items of work covered under Division 6 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 07 1000  
DAMPPROOFING**

**PART 1 – GENERAL**

**1.1 RELATED DOCUMENTS**

- A. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any), apply to the work specified in this section.

**1.2 SCOPE OF WORK**

- A. Provide all labor, materials, services, and equipment required to complete the laminated sheet vapor barriers completely ready to receive concrete.
- B. Vapor barriers are to be placed under all new interior on grade concrete slabs.

**1.3 QUALITY ASSURANCE**

- A. The installer shall be experienced in placement of vapor barrier and shall be associated with waterproofing or roofing work.

**1.4 SUBMITTALS**

- A. Manufacturer's Data, Laminated Vapor Barriers: For information only, submit two copies of specifications, installation instructions and general recommendations from the vapor barrier materials manufacturer's certification or other data substantiating that the materials comply with requirements. Indicate by copy of transmittal form that Installer has received copy of manufacturer's specifications, instructions, and recommendations.

**1.5 JOB CONDITIONS**

- A. Examination of Substrate: The Installer must examine the substrate and the conditions under which the vapor barrier work is to be performed and notify the Contractor in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected projections through the vapor barriers have been installed.
- B. Proceed with vapor barrier work only after substrate construction and framing of openings has been completed, and wood blocking, nailers, curbs, vents, drains and other projections through the vapor barrier have been installed.
- C. Weather Conditions: Proceed with installation only when existing and forecasted weather conditions will permit the work to be performed in accordance with manufacturer's instructions and will permit the immediate installation of other work to be placed over the vapor barrier.

**SECTION 07 1000  
DAMPPROOFING**

**PART 2 - PRODUCTS**

**2.1 LAMINATED PLASTIC VAPOR BARRIER**

- A. Heavy Kraft papers laminated between sheets of inert polyethylene, reinforced with glass fibers, with vapor transmission of .10 perms or less (ASTM E-96).
- B. Products offered by manufacturers to comply with the requirements include the following: Moistop; as manufactured by Fortifiber Corp. or approved equal.

**2.2 VAPOR BARRIER ACCESSORY MATERIALS**

- A. Adhesives: Provide the types of adhesives recommended by the vapor barrier manufacturer for the application shown and condition of installation in each case.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Comply with manufacturer's instructions for the particular conditions of installation in each case. If printed instructions are not available or do not apply to the project conditions, consult the manufacturer's technical representative for specific recommendations before proceeding with the work.
- B. Under Floor Slabs on Grade: Install the type indicated by the method indicated. Exercise care to avoid punctures. Extend coverage to extremity of areas to receive barrier. Attach wherever necessary with adhesive.
- C. Seal joints in vapor barriers, and seal to other surfaces at extremities of coverage, by lapping and bonding with adhesives. Where adhesively sealed joints are not effective, and where nails or staples have been installed, seal with vapor barrier tape. Use vapor barrier tape or strips of vapor barrier material with adhesive to seal punctures, tears, and penetrations through the barrier.

**3.2 PROTECTION OF VAPOR BARRIERS**

- A. Do not allow foot traffic on vapor barriers. Proceed with vapor barrier installation ahead of the installation of insulation or other covering material only to the extent required for proper sequencing of the work.
- B. The vapor-barrier installer shall advise the Contractor of required procedures for surveillance and protection of installed vapor barriers, so that continuing construction activities and the work of other trades will not result in punctures or other forms of damage or deterioration of the vapor barriers.

**END OF SECTION**

**SECTION 07 2600  
VAPOR BARRIERS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Vapor barrier and accessories for installation under concrete slabs.
- B. Related Requirements:
  - 1. Division 01 - General Requirements.
  - 2. Section 03 3000: Cast-in-Place Concrete.
  - 3. Division 09: Finishes; flooring sections.

**1.2 REFERENCES**

- A. American Concrete Institute (ACI) Publication:
  - 1. ACI 302.2R - Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
- B. ASTM International (ASTM):
  - 1. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
  - 2. ASTM D1709 - Standard Test Methods of Impact Resistance of Plastic Film by the Free-Falling Dart Method.
  - 3. ASTM E154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth under Concrete Slabs.
  - 4. ASTM E1643 - Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.
  - 5. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

**1.3 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for vapor barrier and accessories.
- B. Samples:
  - 1. 12 inch by 12 inch vapor barrier samples.
  - 2. Pressure-Sensitive Tape: 12 inch long sample.
- C. Test Reports: Conducted by nationally recognized independent testing agency indicating conformance with specified performance requirements.

**1.4 DELIVERY, STORAGE AND HANDLING**

- A. Deliver, store, handle and protect in accordance with manufacturer's instructions and recommendations.

**SECTION 07 2600  
VAPOR BARRIERS**

- B. Deliver materials in manufacturer's packaging with labels intact.
- C. Store materials in a clean and dry area.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. Multi-layer plastic extrusion manufactured with high grade prime, virgin, polyolefin resins. Thickness shall be 15 mils minimum.
  - 1. Stego Wrap by Stego Industries LLC.
  - 2. Perminator by W.R. Meadows.
  - 3. Ecoshield-E by Epro.
  - 4. Husky Yellow Guard by Poly-America.
  - 5. Equal.
- B. Physical Properties:
  - 1. Maintain permeance of less than 0.01 Perms [grains/(ft<sup>2</sup> · hr · inHg)] as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
  - 2. Class Rating per ASTM E1745: Class A.
  - 3. Puncture resistance per ASTM D1709: 2200 g or higher.
  - 4. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1
- C. Accessories: Provide manufacturer recommended accessories for seams, penetrations, and perimeter edges, including tapes, mastics, termination for a complete vapor barrier installation per ASTM E1643.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Verification of Conditions: Examine subsoil and notify Owner of deficiencies detrimental to proper vapor barrier installation; do not proceed until corrected.

**3.2 INSTALLATION**

- A. Install vapor barrier in accordance with ASTM E1643 and manufacturer's instructions.
  - 1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
  - 2. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise, where obstructed by impediments, such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself using manufacturer ASTM E1643

**SECTION 07 2600**  
**VAPOR BARRIERS**

compliant accessory designed to adhere to concrete. Seam tape shall not be used for sealing the vapor barrier to the foundation wall, grade beam, or slab.

3. Overlap joints 6 inches and seal with manufacturer's seam tape.
  4. Seal vapor barrier penetrations per manufacturer's instructions.
  5. Avoid the use of non-permanent stakes driven through the vapor barrier.
- B. Prior to concrete placement inspect vapor barrier for damage. Clean damaged areas and with vapor barrier material cut a minimum 6 inches larger than damaged area on all sides. Seal the main vapor barrier with continuous seam tape.

3.3 CLEAN UP

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

3.4 PROTECTION

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

END OF SECTION

**SECTION 07 2719  
PLASTIC SHEET AIR BARRIERS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

**A. Section Includes:**

1. Mechanically attached permeable flexible plastic sheet air barriers.
2. Flexible flashing of openings, penetrations, joints, and terminations of exterior walls and taping of seams.

**B. Related Requirements:**

1. Section 06 1000 – Rough Carpentry
2. Section 07 6000 – Flashing and Sheet Metal.
3. Section 07 9200 – Joint Sealants.
4. Section 08 1113 – Hollow Metal Doors and Frames.

**1.2 REFERENCES**

**A. ASTM International:**

1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E1677 - Standard Specification for an Air Barrier (AB) Material or System for Low-Rise Framed Building Walls.
3. ASTM E2178 – Standard Test Method for Air Permeance of Building Materials.

**B. International Code Council (ICC):**

1. ICC-ES Evaluation Reports.

**1.3 SUBMITTALS**

**A. Product Data:** Submit manufacturer's product data for each material and component proposed for installation.

**B. Shop Drawings:** Dimensioned plans and elevations indicating:

1. Complete information as to size and location of openings, sleeves, conduits, ducts, boxes, inserts, attachments, and structural interferences.

**SECTION 07 2719**  
**PLASTIC SHEET AIR BARRIERS**

- 2. Layout of air barrier showing sheet lapping, cutting, flashing, and taping, with references to enlarged details.
- C. Installation Instructions: Submit detailed manufacturer's installation instructions.
- D. Material Samples: Submit minimum 8-1/2-inch by 11-inch samples of air barrier, and 12 inch long flashing.
- E. Test Reports: Submit Test Reports showing performance characteristics equaling or exceeding those specified.
- F. Evaluation Reports: Submit ICC-ES Evaluation Report demonstrating conformance of plastic sheet air barrier to CBC 1404.2, for use as water-resistive barrier.
- G. Qualification Statements:
  - 1. Installer: Statement from plastic sheet air barrier manufacturer indicating installer is approved, certified, or has been trained for the installation of their products.
- H. Commissioning Services Provider (CxSP) will review the Submittals of this Section as part of the Commissioning of Thermal and Moisture Protection.

1.4 QUALITY ASSURANCE

- A. Manufacturer:
  - 1. Plastic sheet air barrier components and accessories shall be from a single source.
  - 2. Manufacturer shall have a minimum of five years of continued experience in the manufacture of the specified products.
- B. Installer:
  - 1. Minimum five years in the installation of air/weather barriers.
  - 2. Trained or certified by manufacturer for the installation of their products.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the job site in undamaged and original packaging.
- B. Store materials in a clean, dry, protected location and within temperature range required by plastic sheet air barrier manufacturer. Protect stored materials from direct sunlight.
- C. Handle materials in accordance with Manufacturer's recommendations.

**SECTION 07 2719  
PLASTIC SHEET AIR BARRIERS**

1.6 WARRANTY

- A. Provide a ten-year manufacturer's standard material warranty for replacement of plastic sheet air barriers that fail due to material defects.
- B. Installation Warranty: Provide a two-year installation warranty for the plastic sheet air barrier, including accessories, against loss of water-tight seal and loss of attachment.
- C. Warranty shall start on the day of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Manufacturer and Products:
  - 1. DuPont (E. I. du Pont de Nemours and Company): Tyvek CommercialWrap.
  - 2. Polymer Group Inc., TyparMetroWrap.
  - 3. Equal.
- B. Properties:
  - 1. Plastic sheet air barrier shall be Type I in accordance to ASTM E1677.
  - 2. Air Permeance: shall not exceed 0.004 cfm/ft<sup>2</sup>, under a pressure differential of 0.3 in w.g. (1.57 psf) (0.02 L/m<sup>2</sup> at 75 Pa), when tested in accordance with ASTM E2178.
  - 3. Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance to ASTM E84.

2.2 MISCELLANEOUS MATERIALS

- A. Flashing: Self-adhesive butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).
  - 1. DuPont (E. I. du Pont de Nemours and Company); FlexWrap and StraightFlash.
  - 2. Polymer Group Inc.; Flashing Flex and Flashing AT.
  - 3. Equal.
- B. Fasteners: Manufacturer approved fasteners.

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**PLASTIC SHEET AIR BARRIERS**

- C. Tape: Three-inch-wide seam tape. Pressure-sensitive plastic tape recommended by air barrier manufacturer for sealing joints and penetrations in air barrier.
- D. Sealants and Adhesive Primers: Compatible with plastic sheet air barrier and flashings system and approved by the Environmental Health Department.
  - 1. Sealant: Dow Corning 732.
  - 2. Spray Adhesive: Design Polymerics DP77.
  - 3. Equal.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions under which plastic sheet air barrier will be installed.
- B. Verify that substrate to receive air barrier has been completed and inspected before commencement of work.
- C. For the installation of flashing and tape, surface shall be smooth, clean, dry, and free from voids, loose substrate, protrusions, or any material that would hinder adhesion.

**3.2 INSTALLATION**

- A. Install plastic sheet air barrier in accordance to manufacturer's installation guidelines, providing continuity throughout exterior walls. Install plastic sheet air barrier with drainage plane surface pattern in vertical position for proper drainage.
- B. Install plastic sheet air barrier starting from the bottom of the building up to ensure proper overlapping of vertical and horizontal seams. Upper layer of plastic sheet air barrier shall overlap bottom layer by a minimum of six inches. Plastic sheet air barrier shall extend over the weep screed by two inches and be taped down.
- C. Secure plastic sheet air barrier by fastening into studs at 12 to 18 inches on center vertically.
- D. Unroll plastic sheet air barrier directly over windows and doors rough openings. Do not install fasteners within six inches of the sills and jambs of the openings and within nine inches of the header, plastic sheet air barrier shall be fastened at these locations during flashing installation.
- E. Horizontal joints shall be overlapped a minimum of six inches with upper courses overlapping lower courses in water-shedding fashion. Vertical seams shall be overlapped a minimum of six inches. Overlap corners of building a minimum of 12 inches.

**SECTION 07 2719**  
**PLASTIC SHEET AIR BARRIERS**

- F. Tape vertical and horizontal seams using adhesive tape recommended by manufacturer. Seal tears and cuts with adhesive tape as recommended by manufacturer.
- G. Place patch or strip of self-adhered flashing over plastic sheet air barrier where base plates, metal channels, z-girts, or other hardware will be installed.

**3.3 FLASHING**

- A. Cut air barrier from door and window openings along with jambs and sill. Cut a header flap at 45 degree angle to expose eight inches of plastic sheet air barrier to allow for head flashing installation. Install sill flashing per manufacturer instructions, overlapping up the jambs a minimum of six inches on each side.
- B. Wrap flashing around interior jamb, wall face, and exterior jamb, overlapping the vertical portion of the sill flashing by at least two inches.
- C. Adhere flashing to the head following manufacturer's instructions. Flashing shall wrap jamb flashings by a minimum of two inches.
- D. Flash piping, conduit, duct and similar penetrations through walls, and flashing ledgers and sills as recommended by manufacturer.

**3.4 FIELD QUALITY CONTROL**

- A. Manufacturer's technical representative shall inspect the work and submit a statement indicating that the installation has been done in conformance to manufacturer's installation instructions.

**3.5 CLEANING**

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

**3.6 PROTECTION**

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

END OF SECTION

**SECTION 07 6000  
FLASHING AND SHEET METAL**

**PART 1 - GENERAL**

**1.1 SUMMARY**

**A. Section Includes:**

1. Sheet metal flashings in connection with roofing.
2. Reglet and counter flashing assemblies.
3. Miscellaneous metal flashing and counter flashing as required, except where provided under Divisions 22 Plumbing, 23 HVAC, or 26 Electrical.
4. Metal edging.
5. Drip flashings.
6. Sheet metal covering at outside storage units.
7. Sheet metal wall coverings.
8. Roof pipe flashings.
9. Other sheet metal items, not necessarily specified herein or in other sections, but required to prevent penetration of water into building.

**B. Related Requirements:**

1. Division 01 - General Requirements.
2. Section 05 5000 – Metal Fabrication.
3. Section 07 9200 - Joint Sealants.
4. Division 8 - Openings.
5. Division 22 - Plumbing.
6. Division 23 - HVAC.
7. Division 26 - Electrical.

**1.2 SUBMITTALS**

- A. Shop Drawings: Submit for fabricated sheet metal indicating shapes, details, methods of joining, anchoring, and fastening, thicknesses and gages of metals, concealed reinforcement, expansion joint details, sections, and profiles.
- B. Samples: Submit Samples for materials or assemblies as requested.
- C. Product Data: Submit brochures of manufactured items.

**SECTION 07 6000  
FLASHING AND SHEET METAL**

**1.3 QUALITY ASSURANCE**

- A. Drawings and requirements of specified govern. Provide the Work of this section in conformance with the Architectural Sheet Metal Manual published by SMACNA for conditions not indicated or specified and for general fabrication of sheet metal items.
- B. Materials shall conform to following standards:
  - 1. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  - 2. ASTM A653 - Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - 3. ASTM B370 - Copper Sheet and Strip for Building Construction.
- C. Pre-installation Meetings: Refer to Division 07 roofing sections as appropriate. Attend the pre-installation and inspection meetings for roofing Work.

**1.4 DELIVERY, STORAGE AND HANDLING**

- A. Do not install bent or otherwise damaged materials.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. Galvanized Sheet Steel: ASTM A653, coating designation G90, hot-dip galvanized.
- E. Fastenings:
  - 1. Galvanized Steel: Nails, rivets, and other fastenings furnished in connection with galvanized sheet steel Work shall be sealed with rust resistive coating. Rivets shall be tinned. Nails and other fastenings shall be zinc-coated.
- F. Soldering Flux: Raw muriatic acid for galvanized steel; rosin for tin, lead, and tinned copper; non-corrosive soldering salts for uncoated copper and acid-type flux formulated for soldering stainless steel.
- G. Solder: ASTM B32, Grade 5A, composed of 95-5 tin-antimony. Name of product manufacturer and grade designation shall be labeled, stamped, or cast onto each coil or bar.

**2.2 FABRICATION**

- A. General:
  - 1. Accurately form sheet metal Work to dimensions and shapes indicated and required. Cope finish molded and brake metal shapes with true, straight, sharp lines and angles and, where intersecting each other, to a precise fit. Unless otherwise specified, all galvanized sheet steel shall be 22 gage. Exposed edges of sheet metal shall have a ½ inch minimum hemmed edge.

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FLASHING AND SHEET METAL**

2. Soldering of sheet steel or copper shall be performed with well-heated copper soldering iron or soldering torch, joints full flowing, neat and consistent. Fill joint completely with solder. Clean materials at joints before soldering, and tin coppers before soldering. Exposed soldering on finished surfaces shall be scraped smooth. Lock seam work shall be fabricated flat and true to line and soldered along its entire length. Acid-fluxed Work shall be neutralized after fabrication.
  3. Form and install sheet metal Work to provide proper allowances for expansion and contraction, without causing undue stresses in any part of completed Work. Installation must be water and weather tight.
- B. Reglet Type Counterflashing: Where roof comes in contact with vertical surfaces, provide counterflashing. Set top of counter flashing 8 inches above roof deck unless otherwise indicated and extend down at least 5 inches or to top of cant strip. Counterflashing and reglets shall be 22 gage galvanized sheet steel. Lap counter flashing and reglets 3 inches minimum at splices and miter at angles or supply special metal corner fittings. Reglet and method of securing flashing shall be so constructed that flashing is firmly locked in place but may be readily removed for replacement.
- C. Roof Pipe Flashings: Provide 24 gage galvanized steel flashings with a storm worker.
- D. Miscellaneous Flashing: Unless otherwise indicated, miscellaneous flashing shall be fabricated of galvanized steel. Exterior doors and windows, unless covered by overhangs shall be provided with 22 gage galvanized steel drip flashing as detailed. At wood construction, nail flashing to framing before paper backed lath is installed.

**PART 3 – EXECUTION**

**3.1 PREPARATION**

- A. Concrete and masonry materials in contact with sheet metal shall be painted with alkali resistant coating, such as heavy-bodied bituminous paint. Wood in contact with sheet metal shall be painted with two coats of aluminum paint or one coat of heavy-bodied bituminous paint.

**3.2 INSTALLATION**

- A. Counterflashing:
1. Install at constant horizontal elevation across roof slope and slope at constant height above cant or as indicated.
  2. Provide minimum 3-inch lap at all end splices of counterflashing.
- B. Galvanized sheet steel parapet coping and flashing shall be continuous over top of parapet to form a watertight cap, with waterproof seams at approximately 10 feet on center, or as indicated. Anchor coping to outside of wall with a continuous cleat face nailed at 24 inch centers. Coping shall be fastened on inside wall with hex head screws and bonded sealing washers through oversized holes in the back

**SECTION 07 6000  
FLASHING AND SHEET METAL**

of the coping. Corners and angles shall be lapped and soldered; do not install joint sealant.

**3.3 TESTING**

A. Perform field water testing to demonstrate installation is watertight. Continue testing with a continuous hose stream applied at base of installation for at least 30 minutes. If leaking is observed, discontinue test and repair installation, then test until satisfactory results are obtained.

**3.4 PROTECTION**

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

**3.5 CLEANING**

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

**END OF SECTION**

## 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. Section 07 6000 - Flashing and Sheet Metal.
  - 4. Division 08 - Openings.
  - 5. Division 09 - Finishes.
  - 6. Section 10 2813 - 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 specified requirements.
- 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.

## SECTION 07 9200 JOINT SEALANTS

### 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.

### 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.

**SECTION 07 9200  
JOINT SEALANTS**

- a. Tremco Inc., Acrylic Latex Caulk.
  - b. Pecora Corporation, AC-20.
  - c. Equal.
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.

## SECTION 07 9200 JOINT SEALANTS

- 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.
- E. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer.
- F. Sealants shall have normal curing schedules, shall be nonstaining, 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 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.

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JOINT SEALANTS**

- 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**

<b>Location</b>	<b>Type</b>	<b>Color</b>
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 system. Skylight framing system. Aluminum entrance system glass and glazing.	Sealant 3	Translucent or 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 recommended by manufacturer, shall be primed before installing sealants. Primer must be installed with a brush that will reach all parts of joints to be filled with sealant.

## SECTION 07 9200 JOINT SEALANTS

- 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 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 joint width.
  - 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.

**SECTION 07 9200  
JOINT SEALANTS**

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 1113  
HOLLOW METAL DOORS AND FRAMES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Hollow Metal doors and frames.
  
- 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 08 7100 - Door Hardware: Hardware coordination.
  - 2. Section 09 9113 – Exterior Painting & 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.
    - a. Shop Drawings: Indicate door elevations, internal reinforcement, closure method, and cut-outs for louvers.

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

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 onsite to permit ventilation.

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. Amweld Building Products, Incorporated,
  - 2. Ceco Door Products,
  - 3. Curries Company,
  - 4. Republic Builders Products,
  - 5. Steelcraft,
  - 6. Or approved equal

2.2 FRAMES MATERIALS

- A. 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.
- B. Interior Frames: 16 gage, cold-rolled steel, mitered and welded, 2-inch profile, for installation in a metal or wood stud and gypsum board partition.

2.3 DOORS CONSTRUCTION

- A. General: Custom-made, flush-panel "seamless type" with one-piece face panels; continuous weld, seamless edge construction with no visible seams or joints on faces or on vertical edges.
  - 1. Doors: SDI-100, Level II - Heavy-Duty - 1-3/4 inch, Model 1 - Full Flush Design, 16 gage cold-rolled steel.
    - a. Exterior doors: Thermal Insulation: Exterior doors shall be insulated to R values scheduled or indicated on drawings.
    - b. Interior Doors: Kraft Honeycomb, Phenolic treated.

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

2.4 ACCESSORIES

- A. Rubber Silencers: Resilient rubber.

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 unit's rigid, neat, and free from warp or buckle. Fabricate KD or welded as specified. 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 District.

3.2 INSTALLATION

- A. Install frames in accordance with SDI-105.

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

- B. Install doors in accordance with DHI.
- 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 09 9113 & 09 9123.
- F. The frame is to be mounted to the studding in such a manner to prevent the 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 door hardware 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 6250**  
**TUBULAR DAYLIGHTING DEVICE**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Tubular daylighting devices (TDD) and accessories.

**1.2 RELATED SECTIONS**

- A. Section 06 1000 - Wood Framing. Site built wood curbs and nailers.
- B. Section 07 6000 - Flashing and Sheet Metal. Metal curb flashings.

**1.3 REFERENCES**

- A. American Architectural Manufacturers Association (AAMA):
  - 1. AAMA/WDMA/CSA 101/I.S.2/A440 - Standard/Specification for Windows, Doors, and Unit Skylights; 2011.
- B. ASTM International (ASTM):
  - 1. ASTM A463/A463M - Standard Specification for Steel Sheet, Aluminum Coated, by the Hot Dip Process.
  - 2. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized), by the Hot Dip Process.
  - 3. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
  - 4. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - 5. ASTM D635 - Test Method for Rate of Burning and/or Extent of Time of Burning of Self-Supporting Plastics in a Horizontal Position.
  - 6. ASTM D1929 - Test Method for Ignition Properties of Plastics.
  - 7. ASTM D2843 - Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics.
  - 8. ASTM F1642 - Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loading.
  - 9. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 10. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings.
  - 11. ASTM E283 - Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
  - 12. ASTM E308 - Standard Practice for Computing the Colors of Objects by Using the CIE System.
  - 13. ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors.
  - 14. ASTM E547 - Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain walls by Cyclic Air Pressure Difference.
  - 15. ASTM E1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missiles

**SECTION 08 6250**  
**TUBULAR DAYLIGHTING DEVICE**

and Exposed to Cyclic Pressure Differentials.

16. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricane.
17. ASTM F2912 - Standard Specification for Glazing and Glazing Systems Subject to Airblast Loading.

C. International Code Council (ICC):

1. ICC 500 - Standard for the Design and Construction of Storm Shelters.

D. International Code Council Evaluation Service, Inc. (ICC-ES):

1. ICC-ES AC-16 - Acceptance Criteria for Plastic Skylights; 2008.

1.4 PERFORMANCE REQUIREMENTS

- A. Daylight Reflective Tubes: Spectralight Infinity with INFRAREDuction Technology combines ultra-high Visible Light reflectance with Ultra-low Infrared (IR) reflectance. Patented spectrally-selective optical surface yields an average total- and specular-reflectance for the Visible Light spectrum (400 nm to 700 nm) providing maximized visible light transmission and less than 25 percent reflectance for Infrared (IR) heat wavelengths (750 nm to 2500 nm) for minimized heat transmission, resulting in a spectrally-selective Total Solar Spectrum (250 nm to 2500 nm) reflectance less than 37 percent, as measured using a Perkin Elmer Lambda 1050 spectrophotometer with a Universal Reflectance Accessory. Color:  $a^*$  and  $b^*$  (defined by CIE  $L^*a^*b^*$  color model) shall not exceed plus 2 or be less than minus 2 as determined in accordance with ASTM E308.
- B. BRIGHTEN UP 290 DS (Suspended or Open Ceilings)
  1. AAMA/WDMA/CSA 101/IS2/A440, Class CW-PG70 size tested 14 inch (350 mm), Type TDDCC.
    - a. Air Infiltration Test: Air infiltration will not exceed 0.30 cfm/sf aperture with a pressure delta of 1.57 psf across the tube when tested in accordance with ASTM E283.
    - b. Water Resistance Test:
      - 1) Passes water resistance; no uncontrolled water leakage with a pressure differential of 10.7 psf (512 Pa) or 15 percent of the design load (whichever is greater) and a water spray rate of 5 gallons/hour/sf for 24 minutes when tested in accordance with ICC-ES AC-16, ASTM E547 and ASTM E331.
    - c. Uniform Load Test: All units tested with a safety factor of (3) for positive pressure and (2) for negative pressure, acting normal to plane of roof in accordance with ASTM E330.
      - 1) No breakage, permanent damage to fasteners, hardware parts, or damage to make system inoperable or cause excessive permanent deflection of any section when tested at a Positive Load of 150 psf (7.18 kPa) or Negative Load of 60 psf (2.87 kPa) in accordance with ICC AC-16 Section A, or Negative Load of 70 psf (3.35 kPa) if tested per ICC AC-16 Section B.

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- d. Fire Testing:
  - 1) When used with the Dome Edge Protection Band, all domes meet fire rating requirements as described in the International Building Code.
  - 2) When used with Dome Edge Protection Band and Rooftop Fire Glazing, all domes meet prescriptive method of Option 1 of IBC 708A.2.1 and IWUIC 101.2.
  - 3) Self-Ignition Temperature - Greater than 650 degrees F per ASTM D1929.
  - 4) Smoke Density: Rating no greater than 450 per ASTM E84 in way intended for use. Classification C.
  - 5) Rate of Burn and/or Extent: Maximum Burning Rate: 2.5 inches/min (62 mm/min) Classification CC-2 per ASTM D635.
  - 6) Rate of Burn and/or Extent: Maximum Burn Extent: 1 inch (25 mm) Classification CC-1 per ASTM D635.

**1.5 SUBMITTALS**

- A. Submit under provisions of Section 01 3000.
- 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. Data sheets showing roof dome assembly, flashing base, reflective tubes, diffuser assembly, and accessories.
  - 4. Installation requirements.
- C. Shop Drawings. Submit shop drawings showing layout, profiles, and product components, including rough opening and framing dimensions, anchorage, roof flashings, and accessories.
- D. Verification Samples: As requested by Architect.
- E. Test Reports: Independent testing agency or evaluation service reports verifying compliance with specified performance requirements.

**1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of twenty years' experience in the top lighting industry. Secondary products shall be acceptable to the primary manufacturer.
- B. Installer Qualifications: All products shall be installed by a single installer with a minimum of five years' experience demonstrated, with adequate equipment, skilled workers, and practical experience to meet the project schedule.
- C. Pre-Installation Meeting: Contractor shall convene a pre-installation meeting on the project site minimum one week before beginning work of this Section. The meeting

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shall include the Architect or Owner's Representative and representatives of all trades related to:

1. Coordinate between the at least the following trades.
  - a. Roofing to install the flashing and skylight. Cut holes in roof deck and flash curb to deck.
  - b. Ensure clear paths for TDD units and coordinate with mechanical so not to interfere with pathways.
2. Verify project requirements and site logistics.
3. Assess integrity of the roofing system and building structure.
4. Review manufacturer's installation instructions and warranty requirements.

**1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products in a cool dry location protected from the weather and in the manufacturer's original unopened containers until ready for installation.
- B. Store products in manufacturer's unopened packaging until ready for installation.

**1.8 PROJECT CONDITIONS**

- A. Coordinate delivery schedule with the Contractor and project schedule to minimize on site storage.
- B. 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.
- C. Store materials in a dry area, protected from freezing, staining, contamination, or damage.

**1.9 WARRANTY**

- A. Daylighting Device: Manufacturer's standard warranty for 10 years.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. Acceptable Manufacturer: Solatube International, Inc.; 2210 Oak Ridge Way, Vista, CA 92081. Tel. Toll Free: 888-765-2882. Tel: (760) 477-1120. Fax: (760) 597-4488. Email: [commsales@solatube.com](mailto:commsales@solatube.com). Web: [www.solatube.com](http://www.solatube.com).
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 6000.

**2.2 TUBULAR DAYLIGHTING DEVICES**

- A. Tubular Daylighting Devices General: Transparent roof-mounted skylight dome and self-flashing curb, reflective tube, and ceiling level diffuser assembly, transferring sunlight to interior spaces; complying with ICC AC-16.

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- B. Brighten Up Series: Solatube Model 290 DS: 14 Inch (350 mm) Daylighting System:
1. Model:
    - a. Solatube Model 290 DS used for daylighting systems with suspended or hard ceilings. AAMA Type TDDCC.
  2. Capture Zone:
    - a. Roof Dome Assembly: Transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.
      - 1) Outer Dome Glazing: Type DA, 0.125 inch (3.25 mm) minimum thickness impact resistant injection molded acrylic classified as CC2 material; UV inhibiting (100 percent UV C, 100 percent UV B and 98.5 percent UV A), impact modified acrylic blend.
        - a) Raybender 3000: Variable prism optic molded into outer dome to capture low angle sunlight and limit high angle sunlight.
      - 2) Tube Ring: Attached to top of base section; 0.090 inch (2.3 mm) nominal thickness injection molded high impact acrylic; to prevent thermal bridging between base flashing and tubing and channel condensed moisture out of tubing.
      - 3) Dome Seal: Polyethylene foam seal, black, 0.13-inch (3.2 mm) thick by 14.62 (371 mm) diameter, 2 PCF polyethylene foam.
      - 4) LightTracker Reflector, made of aluminum sheet, thickness 0.015 inch (0.4 mm) with Spectralight Infinity. Positioned in the dome to capture low angle sunlight.
    - b. Dome Options:
      - 1) Dome Edge Protection Band: Type PB, for fire rated Class A, B or C roof applications. Aluminized steel nominal thickness of 0.028 inches (0.7 mm).
    - c. Flashings:
      - 1) Roof Flashing Base:
        - a) One Piece: One-piece, seamless, leak-proof flashing functioning as base support for dome and top of tube. Sheet steel, corrosion resistant conforming to ASTM A653/A653M or ASTM A463/A463M or ASTM A792/A792M, 0.028 inch (0.7 mm) plus or minus .006 inch (.015 mm) thick.
          - 1) Base Style: Type FC, Curb Cap, with inside dimensions of 27 inches by 27 inches to cover curb.
    - d. Curbs: Metal Insulated Roof Curb: Corrosion resistant 18 Gauge hot-dipped galvanized steel conforming to ASTM A653 G90 with continuous welded seams, integrated base plate for water tightness and extra strength, lined with 1-1/2-inch fiberglass fireproof sound attenuating thermal insulation, factory installed 2 by 2 treated wood nailer secured to top ledge of curb. Curb designed for single-ply roofing, lightweight fill, or tapered insulation low slope roof types.
      - 1) C14 14 inch (356 mm) high Metal insulated curb
      - 2) Flashing Options:

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- a) Curb Cap Insulation: Type CCI, nominal 1-inch-thick thermal isolation pad to reduce thermal conduction between curb-cap and tubing and thermal convection between room air and curb-cap. Rated R-6 ( $^{\circ}\text{F}\cdot\text{ft}^2\cdot\text{hr}/\text{Btu}$ ) Insulation is Polyisocyanurate foam utilizing CFC, HCFC, and HFC free blowing agent. Type-1 Class-1 per ASTM C 1289; Passes UL 1715 (15-minute thermal barrier per IBC 2603.4); Attic ventilation may be required per IBC 1203.2( $^{\circ}\text{F}\cdot\text{ft}^2\cdot\text{hr}/\text{Btu}$ )
  - b) Roof Flashing Turret Extensions: Provide manufacturers' standard extension tubes for applications requiring it.
3. Transfer Zone:
- a. Extension Tubes: Aluminum sheet, thickness 0.015 inch (0.4 mm).
    - 1) Reflective Tubes:
      - a) Reflective Extension Tube: Type EXX with total length of run as indicated on the Drawings.
      - b) Interior Finish: Spectralight Infinity with INFRAREDuction Technology combining ultra-high Visible Light reflectance with Ultra-low Infrared (IR) reflectance.
      - c) Color:  $a^*$  and  $b^*$  (defined by CIE  $L^*a^*b^*$  color model) shall not exceed plus 2 or be less than minus 2 as determined in accordance with ASTM E308.
    - 2) Tube Options
      - a) Extension Tube Angle Adapter: Provide manufacturer's standard adapters for applications requiring:
        - 1) Type A1 one 0-to-90-degree extension tube angle adapter.
      - b) Severe Climate Glazing: Type SCG, PET GAG plastic glazing to minimize potential for condensation and heat loss. Nominal thickness is 0.039 inches (0.99 mm).
      - c) Wire Suspension Kit: Type E, use the wire suspension kit when additional bracing to the structure is required.
      - d) Thermal Insulation Panel: Type TIP, high-performance dual-glazed, tube insulation system.
4. Delivery Zone:
- a. Ceiling Ring: Injection molded impact resistant acrylic. Nominal thickness is 0.110 inches (2.8 mm).
  - b. Ceiling Ring Seal: Polyethylene foam seal, white, 0.25 inch (6.4 mm) wide by 0.19 inch (4.8 mm) high, 2 PCF polyethylene foam with low-tack pressure sensitive adhesive.
  - c. Upper glazing: PET GAG plastic with EPDM low density sponge seal to minimize condensation and bug, dirt, and air infiltration per ASTM E283. The nominal thickness is 0.039 inches (0.99 mm).
    - 1) Natural Effect Lens: Type LN.
  - d. Round Diffusers/Decorative Fixtures: Dual Glazed Diffuser Assembly.
    - 1) Lower glazing with integral injection molded acrylic Dress Ring

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classified as CC2 material. Nominal thickness is 0.110 inches (2.8 mm)

- a) Classic Vusion Diffuser: Type L4, molded acrylic plastic classified as CC2 material (nominal thickness 0.090 inches (2.29 mm) with injection molded acrylic Diffuser Trim Ring.

### 2.3 ACCESSORIES

- A. Fasteners: Same material as metals being fastened, non-magnetic steel, non-corrosive metal of type recommended by manufacturer, or injection molded nylon.
- B. Suspension Wire: Steel, annealed, galvanized finish, size and type for application and ceiling system requirement.
- C. Sealant: Polyurethane or copolymer based elastomeric sealant as provided or recommended by manufacturer.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Examine openings, substrates, structural support, anchorage, and conditions for compliance with requirements for installation tolerances and other conditions.
- C. If substrate and rough opening preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### 3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Coordinate requirements for power supply, conduit, and wiring.
- C. 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 printed instructions.
- B. Coordinate installation with substrates, air and vapor retarders, roof insulation, roofing membrane, and flashing to ensure that each element of the Work performs properly, and that finished installation is weather tight.
  - 1. Install flashing to produce weatherproof seal with curb and overlap with roofing system termination at top of curb.
  - 2. Provide thermal isolation when components penetrate or disrupt building insulation. Pack fibrous insulation in rough opening to maintain continuity of thermal barriers.

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- 3. Coordinate attachment and seal of perimeter air and vapor barrier material.
  - C. Where metal surfaces of tubular unit skylights will contact incompatible metal or corrosive substrates, including preservative-treated wood, provide permanent separation as recommended by manufacturer
  - D. Align device free of warp or twist, maintain dimensional tolerances.
  - E. Inspect installation to verify secure and proper mounting. Test each fixture to verify operation, control functions, and performance. Correct deficiencies.
- 3.4 CLEANING
- A. Clean exposed surfaces according to manufacturer's written instructions. Touch up damaged metal coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- 3.5 PROTECTION
- A. Protect installed products until completion of project.
  - B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

**SECTION 08 7100  
DOOR HARDWARE**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Door hardware
- B. Related Divisions:
  - 1. Section 07 9200 – Joint Sealants.
  - 2. Section 08 1113 – Hollow Metal Doors and Frames.
- C. Specific Omissions: Hardware for the following is specified or indicated elsewhere.
  - 1. Signs.
  - 2. Toilet accessories, including grab bars.
  - 3. Installation.

**1.2 REFERENCES**

- A. Use date of standard in effect as of Bid date.
  - 1. American National Standards Institute – ANSI 156.18 – Materials and Finishes.
    - a) ANSI A156.18 Materials and Finishes
  - 2. BHMA – Builders Hardware Manufacturers Association
  - 3. DHI – Door and Hardware Institute
  - 4. NFPA – National Fire Protection Association
    - a) NFPA 80 – Fire Doors and Windows
    - b) NFPA 105 – Smoke and Draft Control Door Assemblies
    - c) NFPA 252 – Fire Tests of Door Assemblies
  - 5. UL – Underwriters Laboratories
    - a) UL10C – Positive Pressure Fire Tests of Door Assemblies.
    - b) UL 305 – Panic Hardware
  - 6. WHI – Warnock Hersey Incorporated State of California Building Code
  - 7. Local applicable codes
- B. Abbreviations
  - 1. Manufacturers: see table at 2.1.A of this section

**1.3 SUBMITTALS & SUBSTITUTIONS**

**SECTION 08 7100  
DOOR HARDWARE**

- A. **SUBMITTALS:** Submit six copies of schedule per D. Only submittals printed on 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.
- 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.
- 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 Engineer for resolution.
- E. Substitutions per Section 01 6000 – Product Requirements. Include product data and indicate benefit to the Project. Furnish operating samples on request. Engineer will make final determination of equivalency.
- F. Items listed with no substitute manufacturers have been requested by District to meet existing standard.
- G. 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 Engineer and Contractor.

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DOOR HARDWARE**

- a. Responsible for detailing, scheduling, and ordering of finish hardware. Detailing implies that the submitted schedule of hardware is correct and complete for the intended function and performance of the openings.
  - A. Hardware: Free of defects, blemishes, and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges, and closers) from one manufacturer.
  - B. Furnish hardware items required to complete the work in accordance with specified performance level and design intent, complying with manufacturers' instructions and code requirements.
- 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 District'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 nearly as practical the same operation and quality as type specified, subject to Engineer's approval.
  - B. Coordination: Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of 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 finish floor materials and floor-mounted hardware.
    - 4. At masonry construction, coordinate with the anchoring and frame 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. 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.

**SECTION 08 7100  
DOOR HARDWARE**

1.7 WARRANTY

- A. Part of respective manufacturers' regular terms of sale. Provide manufacturers' written warranties:
  - 1. Locksets: Three years.
  - 2. Closers: Ten years mechanical.
  - 3. Hinges: One year.
  - 4. Other Hardware: Two years.

1.8 REGULATORY REQUIREMENTS 2022 CALIFORNIA BUILDING CODE

- A. Locate latching hardware between 34 inches to 44 inches above the finished floor, according to the California Building Code, Section 11B-404.2.7.
- B. Handles, pull, latches, locks, other operating devices: readily operable from egress side without tight grasping, tight pinching, or twisting of the wrist to operate. California Building Code 11B-309.4.
- C. 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 per 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.
  - 1. Door latch shall release when subjected to a 15-pound force.
  - 2. Door must be set in motion when subjected to a 30-pound force.
  - 3. Once set in motion, door shall swing to a full-open position when subjected to a 5-pound force.
- D. Adjust door closer sweep periods so that from an open position of 90 degrees, the time require to move the door to a position of 12 degrees from the latch is 5 seconds minimum, measured to the landing side of the door, per California Building Code Section 11B-404.2.8.1.
- E. Adjust delayed action spring hinge at accessible stalls for so that from the open position of 70 degrees, the door or gate shall move to the closed position in 1.5 seconds minimum, per California Building Code Section 11B-404.2.8.2.
- F. Smooth surfaces at bottom 10 inches of push sides of doors, facilitating push-open with wheelchair footrests, per California Building Code Section 11B-404.2.10.
- F. Door opening clear width at accessible stalls no less than 32 inches, measured from face of frame stop, or edge of inactive leaf of pair of doors, to door face with door opened to 90 degrees. Hardware projection not a factor in clear width if located above 30 inches and the hardware projects no more than 4 inches. California Building Code Section 11B-404.2.3.
- G. Door opening clear height no less than 80 inches measured from top of sill to bottom of frame header stop. Projections into clear opening height not to exceed 2 inches. California Building Code Section 11B-307.4 Exception.

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- H. Thresholds: floor or landing no more than 0.50 inches below the top of the threshold of the doorway. Change in level between 0.25 inches and 0.50 inches: beveled to slope no greater than 1:2 (50 percent slope). California Building Code Section 11B-404.2.5 & 11B-303.2.
- I. Floor stops: Do not locate in path of travel. Locate no more than 4 inches from walls.
- J. Meet California Building Code Sections 11B-404.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS:**

- A. Listed acceptable alternate manufacturers in accordance with the Item Equivalency provisions:
  - 1. Hinges
    - a. (IVES) Ives.
    - b. Select.
    - c. Hager.
    - d. Or approved equal.
  - 2. Key System
    - a. (CLK) Clark Security
    - b. Schlage.
    - c. Or approved equal.
  - 3. Mechanical Locks
    - a. (SCH) Schlage.
    - b. Falcon.
    - c. Or approved equal.
  - 4. Closers
    - a. (LCN) LCN
    - b. Or approved equal.
  - 5. Push & Pull Plates
    - a. (IVES) Ives.
    - b. Trimco
    - c. Or approved equal.
  - 6. Kickplates
    - a. (IVES) Ives.
    - b. Trimco.
    - c. Or approved equal.
  - 7. Stops & Holders
    - a. (TRI) Trimco.
    - b. Rockwood.
    - c. Or approved equal.
  - 8. Threshold
    - a. (PEM) Pemko.
    - b. Or approved equal.

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**2.2 HINGING METHODS:**

- A. Drawings typically depict doors at 90 degrees; doors will actually 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 Engineer 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 Engineer of deviation from scheduled hardware.
- C. Continuous Hinges:
  - 1. Pinned steel/stainless steel type: continuous stainless steel, 0.25-inch diameter stainless-steel hinge pin, 316 alloy.
    - a. Use engineered application-specific wide-throw units as needed to provide maximum swing degree of swing, advise architect if required width exceeds 8 inches.

**2.3 LOCKSETS, LATCHSETS, DEADBOLTS**

- D. Mortise Locksets and Latchsets: as scheduled.
  - 1. Chassis: cold-rolled steel, handing field-changeable without disassembly.
  - 2. Universal lock case – 10 functions in one case.
  - 3. Floating mounting tabs automatically adjusts to fit a beveled door edge.
  - 4. Latchbolts: 0.75 inch throw stainless steel anti-friction type.
  - 5. Lever Trim: through-bolted, accessible design, cast lever or solid extruded bar type levers as scheduled. Filled hollow tube design unacceptable.
    - a. Spindles: security design independent breakaway. Breakage of outside lever does not allow access to inside lever's hubworks to gain wrongful entry.
    - b. Inside lever applied by screwless shank mounting – no exposed trim mount screws.
    - c. Levers rotate up or down for ease of use.
    - d. Vandalgard locks: locked lever freely rotates down while remaining securely locked. This feature prevents damage to internal lock components when subjected to excessive force.
  - 6. Furnish solid cylinder collars with wave springs. Wall of collar to cover rim of mortise cylinder.
  - 7. Thumbturns: accessible design not requiring pinching or twisting motions to operate.
  - 8. Deadbolts: stainless steel 1-inch throw.
  - 9. Electric operation: Manufacturer-installed continuous duty solenoid.
  - 10. Strikes: 16 gage curved steel, bronze or brass with 1 inch deep box construction, lips of sufficient length to clear trim and protect clothing.
  - 11. Scheduled Lock Series and Design: Schlage L series, 03L design or approved equal.

## SECTION 08 7100 DOOR HARDWARE

### 2.6 CLOSERS

#### A. Surface Closers:

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.
1. ISO 2000 certified. Units stamped with date-of-manufacture code.
2. Independent lab-tested 10,000,000 cycles.
3. Non-sized and adjustable. Place closers inside building, stairs, and rooms.
4. Plates, brackets, and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.
5. Advanced Variable Backcheck (AVB): where scheduled, these units commence backcheck at approximately 45 degrees.
6. Adjustable to open with not more than 5.0-pounds pressure to open at exterior doors and 5.0-pounds at interior doors. As per California Building Code, Section 1133B.2.5 and 1008.1.3, 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. EDA arms: rigid main and forearm, reinforced elbow.
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 -30 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.

#### B. High Security Closers: Removable heavy gage metal case. Cylinders independent test lab certified to exceed 10,000,000 cycles. Vandal and tamper resistant forged steel arm. Exposed fasteners: pinned TORX type.

1. Advanced Variable Backcheck (AVB): where scheduled, these units commence backcheck at approximately 45 degrees.

### 2.7 OTHER HARDWARE

#### A. Door Stops: Provide stops to protect walls, casework, or other hardware.

1. Unless otherwise noted in Hardware Sets, provide wall type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.
2. Locate overhead stops for maximum possible opening. Consult with District for furniture locations. Minimum: 90deg stop / 95deg deadstop. Note degree of opening in submittal.

## SECTION 08 7100 DOOR HARDWARE

- B. Through-bolts: Do not use. Coordinate with hollow metal frames and doors; ensure provision of proper embedded blocking to support wood screws for mounting door closers.
  - 1. Exception: surface-mounted overhead stops, holders, and friction stays.

### 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 manufacturer's "SRI" special rust-inhibiting epoxy undercoat.

### 2.9 KEYING REQUIREMENTS:

- A. Key System: Clark Security Sargent "LA" keyway or approved equal utility-patented keyway, interchangeable core. Utility patent protection to extend at least until 2029. Key blanks available only from factory-direct sources, not available from after-market key blank manufacturers. Initiate and conduct meeting(s) with Engineer to determine system keyway(s), keybow styles, structure, and degree of geographic exclusivity. Do not order keys or cylinders without written confirmation of actual requirements from the Engineer.
- B. Keys
  - 1. Factory registered master key system.
  - 2. Construction keying: furnish temporary keyed-alike cores. Remove at substantial completion and install permanent cylinders/cores in District's presence. Demonstrate that construction key no longer operates.
  - 3. Furnish 10 construction keys.
  - 4. Furnish 2 construction control keys.
- C. Key Cylinders: furnish utility patented, 6-pin solid brass construction.
- D. Cylinder cores: furnish keyed at factory of lock manufacturer where permanent records are maintained. Locks and cylinders same manufacturer.
- E. Permanent keys: use secured shipment direct from point of origination to District.
  - 1. For estimate: 3 keys per change combination, 5 master keys per group, 5 grand-master keys, 3 control keys.
  - 2. For estimate: VKC stamping plus "DO NOT DUPLICATE."
  - 3. Bitting List: use secured shipment direct from point of origination to District upon completion.

## PART 3 - EXECUTION

### 3.1 ACCEPTABLE INSTALLERS

## SECTION 08 7100 DOOR HARDWARE

- 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 Engineer 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 1133B.2.5.2.
  - 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.

### 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 equal anchoring device for screws.
  - 3. Use manufacturers' fasteners furnished with hardware items or submit Request for Substitution with Engineer.
  - 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 situation is questionable or difficult, contact Engineer for direction.
- C. Core concrete for exterior door stop anchors. Set anchors in approved non-shrink grout.
- D. Locate overhead stops for minimum 90 degrees at rest and for maximum allowable degree of swing.

## **SECTION 08 7100 DOOR HARDWARE**

- 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 District items not scheduled for reuse.

### **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 Engineer's satisfaction.
  - 2. Adjust doors to fully latch with no more than 1 pound of pressure.
  - 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.

### **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.

## SECTION 08 7100 DOOR HARDWARE

146871 X-130707 Version 1

Legend:

 Link to catalog cut sheet








 Electrified Opening

### Hardware Group No. 001

For use on Door #(s):

01                      03

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	SET	GATE HINGE/CLOSER	MAMMOTH-180		689	LOC
1	EA	DBL CYL DEAD LOCK	L9462T		626	SCH
2	EA	FSIC CORE	23-030		626	SCH
1	SET	ANTI VANDAL PULL	1097 HA (SCHLAGE L9462) BTC MOUNTING		630	TRM
1	EA	SIGN	"THESE DOORS TO REMAIN UNLOCKED ....."			ADA
1	EA	KICK PLATE	K0050 10" X 2" LDW B4E		630	TRM
1	EA	WALL STOP & HOLDER	1254		626	TRM
1	EA	FLOOR STOP	7280		630	TRM
3	EA	SILENCER-METAL	1229A			TRM

SIGNAGE "THESE DOORS TO REMAIN UNLOCKED DURING BUSSINESS HOURS"

HINGE/CLOSER

GATE FABRICATOR TO PROVIDE THE REQUIRED REINFORCEMENT FOR THE SPECIFIED HARDWARE COMPONENTS

WALL STOP & HOLDER TO BE MOUNTED AT TOP OF GATE

BOTTOM OF GATE 10 INCH HEIGHT TO BE CLEAR TO MEET ADA REQUIREMENT









EXTERIOR - ANTI-VANDAL PULL BACK TO BACK MOUNTING

### Hardware Group No. 002

For use on Door #(s):

07

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		630	IVE
1	EA	STOREROOM LOCK	L9080T 17A		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
1	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ		689	LCN
1	EA	GASKETING	188SBK PSA		BK	ZER
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	547A-223		A	ZER









## SECTION 08 7100 DOOR HARDWARE

### Hardware Group No. 003

For use on Door #(s):

06

Provide each SGL door(s) with the following:








QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		630	IVE
1	EA	STOREROOM LOCK	L9080T 17A		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
1	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ		689	LCN
1	EA	GASKETING	188SBK PSA		BK	ZER
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	547A-223		A	ZER

### Hardware Group No. 004

For use on Door #(s):

04

Provide each SGL door(s) with the following:












QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		630	IVE
1	EA	STOREROOM LOCK	L9080T 17A		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	GASKETING	188SBK PSA		BK	ZER
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	547A-223		A	ZER

### Hardware Group No. 005

For use on Door #(s):

05

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1HW 5 X 4.5 NRP		630	IVE
1	SET	AUTO FLUSH BOLT	3800 SERIES		626	TRM
1	EA	STOREROOM LOCK	L9080T 17A		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
2	EA	DUST PROOF STRIKE	3910/3910N /3911		630	TRM
1	EA	COORDINATOR X FILLER BAR X BRACKETS	3094 SERIES		600	TRM
2	EA	MOUNTING BRACKET	3095/3096		689	TRM
2	EA	SURFACE CLOSER	4040XP SCUSH WMS		689	LCN
2	EA	KICK PLATE	K0050 10" X 1" LDW		630	TRM
1	EA	GASKETING	188SBK PSA		BK	ZER
2	EA	DOOR SWEEP	39A		A	ZER
1	EA	ASTRAGAL	44ST X 188		STST	ZER
1	EA	THRESHOLD	547A-223		A	ZER

**SECTION 08 7100  
DOOR HARDWARE**

**Hardware Group No. 006**

For use on Door #(s):

02

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1HW 5 X 4.5 NRP		630	IVE
1	SET	AUTO FLUSH BOLT	3800 SERIES		626	TRM
1	EA	CLASSROOM LOCK	L9070T.17.626.A.626.17.626.A.626		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
2	EA	DUST PROOF STRIKE	3910/3910N /3911		630	TRM
1	EA	COORDINATOR X FILLER BAR X BRACKETS	3094 SERIES		600	TRM
2	EA	MOUNTING BRACKET	3095/3096		689	TRM
2	EA	SURFACE CLOSER	4040XP SCUSH WMS		689	LCN
2	EA	KICK PLATE	K0050 10" X 1" LDW		630	TRM
1	EA	GASKETING	188SBK PSA		BK	ZER
2	EA	DOOR SWEEP	39A		A	ZER
1	EA	ASTRAGAL	44ST X 188		STST	ZER
1	EA	THRESHOLD	547A-223		A	ZER

**Hardware Group No. 007**

For use on Door #(s):

13                      14

Provide each RU door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
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ALL HARDWARE BY ROLL UP DOOR MANUFACTURER

Payment for items of work covered under Division 8 of the plans and these specifications shall be based on the lump sum bid pricing for the various items identified under Door and Windows in the Bid Specifications.

END OF SECTION

**SECTION 08 9000  
LOUVERS AND VENTS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

**A. Section Includes:**

1. Fixed, extruded-steel louvers.

**1.2 PERFORMANCE REQUIREMENTS**

**A. Design:** Design louvers, including comprehensive engineering analysis by a qualified engineer, using structural performance requirements and design criteria indicated.

**B. Structural Performance:** Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors.

1. **Wind Loads:** Determine loads based on a uniform pressure of 30 lb./sq. ft. (1435 Pa), acting inward or outward.

**C. Louver Performance Ratings:** Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

**1.3 SUBMITTALS**

**A. Product Data:** For each type of product indicated.

1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

**B. Shop Drawings:** For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

**C. Samples:** For each type of metal finish required.

**D. Submittal:** For louvers indicated to comply with structural performance requirements and design criteria indicated.

**E. Product Test Reports:** Based on tests performed according to AMCA 500-L.

**SECTION 08 9000  
LOUVERS AND VENTS**

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. Aluminum Extrusions: ASTM B 221M, Alloy 6063-T5.
- B. Aluminum Sheet: ASTM B 209M, Alloy 3003 with temper as required for forming.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
  - 1. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.

**2.2 FABRICATION, GENERAL**

- A. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
- B. Join frame members to each other and to fixed louver blades with fillet welds concealed from view welds, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

**2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS**

- A. Horizontal Non-drainable Blade Louver; model E4JS – 4” deep 45 degree standard J blade extruded aluminum stationary louver.
  - 1. Basis-of-Design Product: Architectural Louvers Co. (Harray, LLC); Model E4JS. Subject to compliance with requirements, provide the specified product or comparable product by one of the following:
    - a. Manufacturers of equivalent products submitted and approved in accordance with Section 01 2513 - Product Substitution Procedures.
  - 2. Louver Depth: 4 inches (100 mm)
  - 3. Blade Profile: Plain blade without center baffle.
  - 4. Frame and Blade Nominal Thickness: Not less than 0.080 inch (2.03 mm).
  - 5. Louver Performance Ratings:
    - a. Free Area: Not less than 8.06 sq. ft. (0.75 sq. m) for 48-inch- (1220-mm-) wide by 48-inch- (1220-mm-) high louver.
    - b. Point of Beginning Water Penetration: Not less than 888 fpm (4.5 m/s).
    - c. Air Performance: Not more than 0.13-inch wg (32-Pa) static pressure drop at 800 fpm (4.6 m/s) free-area velocity.
  - 6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

**SECTION 08 9000  
LOUVERS AND VENTS**

**2.5 ALUMINUM FINISHES**

- A. High-Performance Organic Finish: 3-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - 1. Color and Gloss: As selected by Architect from manufacturer's full range. Provided with powder coating finish.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather-tight connection.
- C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- D. Repair damaged finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory and refinish entire unit or provide new units.
- E. Protect galvanized and nonferrous-metal surfaces that will be in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint.

**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 – Dampproofing.
  - 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 Nondecorated 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 by weight after a two-hour immersion when tested in accordance with ASTM C473.

**1.5 SUBMITTALS**

- A. Submit under provisions of Section 01 3000 – 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. United States Gypsum Company.
  - 2. National Gypsum Properties, LLC.
  - 3. American Gypsum.
  - 3. Or approved equal.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 6000 – Product Requirements.

2.2 GYPSUM BOARD

- A. Water-Resistant Gypsum Backing Board: ASTM C630; 5/8 inch thick, ends cut square and finished smooth. 48-inch width, maximum permissible length; ends and edges straight and solid, edges tapered. Board consisting of a noncombustible water-resistant gypsum core, surfaced on face and back with water-repellent paper bonded to the core & face paper folded around long edges to reinforce and protect core, to be used at wet locations, see plans.
- B. Hi-impact XP Gypsum Board: 5/8" thick moisture and mold resistant with tapered edges; paper faced gypsum board with superior impact resistance & face paper folded around long edges to reinforce and protect core, ends cut square and finished smooth, typical at all locations. See plans for more info. Typical provide moisture resistant at wet locations.

**SECTION 09 2900  
GYPSUM BOARD**

**2.3 ACCESSORIES**

- A. Corner Beads and Edge Trim: GA 201 and GA 216.
- B. Joint Compound for gypsum board products: meeting the following requirements:
  - a. Shall conform to ASTM C475.
  - b. In areas subject to moisture after installation such as bathrooms and locker areas use setting type joint compound.
- C. Joint Tapes for gypsum boards: Shall conform to ASTM C475.
- D. Finishing Materials: Texture coat finish material shall be manufactured by U.S. Gypsum, Hamilton, or Highland Stucco and Lime Products, Inc., or equal.
- E. Acoustical Sealant: Non-hardening, non-shrinking, for use in conjunction with gypsum board, as recommended by Board Manufacturer and conforming to ASTM C919. Sealant shall maintain fire and sound rating assembly.
- F. Fasteners:
  - 1. Self-drilling, self-tapping bugle-head drywall screws; in conformance to ASTM C1002. No. 6 Type S or S12, 1 5/8-inch long for metal framing,
  - 2. Wood framing: Screws: Type W 1 5/8-inch minimum length for single-layer panels. Screws shall be furnished with a corrosion-resistant treatment.
  - 3. Adhesive: as recommended by board manufacturer and in compliance to ASTM C557.

**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 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 District.

**SECTION 09 2900  
GYPSUM BOARD**

**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.

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**

**SECTION 09 3000  
TILE**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Tile and Accessories: Wall Glazed.
- B. Related Sections:
  - 1. Section 07 9200 - Joint Sealant.

**1.2 REFERENCES**

- A. American National Standards Institute (ANSI):
  - 1. ANSI A108.5, 1999 - Specifications for Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
  - 2. ANSI A108.10, 1999 - Specifications for Installation of Grout in Tilework.
  - 3. ANSI A118.1, 1999 - Standard Specification for Dry-Set Portland Cement Mortar.
  - 4. ANSI A118.4, 1999 - Latex-Portland Cement Mortar.
  - 5. ANSI A118.9, 1999 - Test Methods and Specifications for Cementitious Backer Units
  - 6. ANSI A137.1, 1988 - Specifications for Ceramic Tile.
- B. ASTM International (ASTM):
  - 1. ASTM C 50 - Standard Specification for Portland Cement.
  - 2. ASTM C 207 - Standard Specification for Hydrated Lime for Masonry Purposes.
  - 3. ASTM C 847 - Standard Specification for Metal Lath.
- C. Tile Council of North America (TCNA): TCA Handbook for Ceramic Tile Installation, 2007.

**1.3 SUBMITTALS**

- A. Section 01 3300 – Submittal Procedures: Procedures for submittals.
  - 1. Manufacturer's data sheets on each product to be used, including:
    - a. Preparation instructions and recommendations.
    - b. Storage and handling requirements and recommendations.
    - c. Installation methods.
  - 2. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
  - 3. Manufacturer's Certificate:
    - a. Certify that products meet or exceed specified requirements.
    - b. For each shipment, type and composition of tile provide a Master Grade Certificate signed by the manufacturer and the installer certifying that products meet or exceed the specified requirements of ANSI A137.1.
  - 4. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

**SECTION 09 3000  
TILE**

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Company experienced in performing the Work of this Section.
- B. Single Source Responsibility: Obtain each type and color of tile from a single source. Obtain each type and color of mortar, adhesive and grout from the same source.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging until ready for installation.
- B. Protect adhesives and liquid additives from freezing or overheating in accordance with manufacturer's instructions.
- C. Store tile and setting materials on elevated platforms, under cover and in a dry location and protect from contamination, dampness, freezing, or overheating.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Do not install adhesives in an unventilated environment.
- B. Maintain ambient and substrate temperature of 50 degrees F during tiling and for a minimum of 7 days after completion.

1.7 EXTRA MATERIALS

- A. Provide for District's use a minimum of 2 percent of the primary sizes and colors of tile specified, boxed, and clearly labeled.

**PART 2 PRODUCTS**

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering items which may be incorporated I the Work include the following:
  - 1. Dal-Tile Corporation.
  - 2. American Marazzi Tile, Inc.
  - 3. Roca Tile Group.
  - 4. Or approved equal as provided in Section 01 6000 – Product Requirements.

2.2 TILE

- A. General: Provide tile that complies with ANSI A137.1 for types, compositions and other characteristics indicated. Provide tile in the locations and of the types colors and pattern indicated on the Drawings and identified in the Schedule and the end of this Section. Tile shall also be provided in accordance with the following:
  - 1. Factory Blending: For tile exhibiting color variations within the ranges selected under Submittal of samples, blend tile in the factory and package so tile taken

## SECTION 09 3000 TILE

from one package shows the same range of colors as those taken from other packages.

2. Mounting: For factory mounted tile, provide back or edge mounted tile assemblies as standard with the manufacturer, unless otherwise specified.
3. Factory Applied Temporary Protective Coatings: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with a continuous film of petroleum paraffin wax applied hot. Do not coat unexposed tile surfaces.

### B. Floor and Wall Porcelain Tile:

1. Colors: As scheduled.
2. Trim Units: Matching cove base, cove base corner, bullnose, cove/inside finger cove, radius cap, sink rail incorner/outcorner, outside cove corner shapes in sizes coordinated with field tile.
3. Spacing: install with 1/16" spacing to accept un-sanded grout only.

### C. Floor and Wall Quarry Tile:

1. Colors: As scheduled.
2. Trim Units: Matching cove base, cove base corner, bullnose, cove/inside finger cove, radius cap, sink rail incorner/outcorner, outside cove corner shapes in sizes coordinated with field tile.
3. Spacing: install with 1/16" spacing to accept un-sanded grout only.

### D. Trim:

1. Integral bullnose at external corners.
2. Provide bullnose where tile projects from jamb.
3. Bullnose w/ cove base at bottom walls.

### E. Stone Thresholds:

1. Exterior installation: Marble thresholds with minimum abrasive hardness value of 10 tested in accordance with ASTM C241.
2. Size and profile shaped to provide transition between tile surfaces and adjoining finished floor surfaces, or as indicated. Width not less than 4 inches. Edges beveled on a slope of no greater than 1:2. Cut to fit door frame profile.

### F. See Color / Material Schedule on Drawings for size and color.

## 2.3 SETTING MATERIALS

### A. Mortar Bed Materials:

1. Portland cement: ASTM C150, type 1, gray or white.
2. Hydrated Lime: ASTM C207, Type S.
3. Sand: ASTM C144, fine.
4. Latex additive: As approved.
5. Water: Clean and potable.

**SECTION 09 3000**  
**TILE**

- B. Grout:
  - 1. Standard Grout: Cement grout, sanded or unsanded, as specified in ANSI A118.6; color as selected.
  - 2. Polymer modified cement grout, sanded or unsanded, as specified in ANSI A118.7; color as selected.
- C. Membrane at Walls:
  - 1. 4 mil (0.1 mm) thick polyethylene film, ASTM D4397, ANSI A 118.10.
  - 2. Reinforced asphalt paper.
- D. Cementitious Backing Units
  - 1. ANSI A 118.9 or ASTM C 1325 (Type B).
  - 2. 2" alkali – resistant glass fiber mesh type.

**PART 2 EXECUTION**

**3.1 EXAMINATION**

- A. Section 01 73 00 – Execution: Verification of existing conditions before starting work.
  - 1. Verify that wall surfaces are free of substances which would impair bonding of setting materials, smooth and flat within tolerances specified in ANSI A137.1 and are ready to receive tile.

**3.2 PREPARATION**

- A. Protect surrounding work from damage.
- B. Remove any curing compounds or other contaminants.
- C. Vacuum clean surfaces and damp clean.
- D. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- E. Install cementitious backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of dry-set mortar to a feather edge.
- F. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

**3.3 INSTALLATION - GENERAL**

- A. Install tile and grout in accordance with applicable requirements of ANSI A108.1 through A108.13, manufacturer's instructions, and TCA Handbook recommendations.
- B. Lay tile to pattern indicated. Arrange pattern so that a full tile or joint is centered on each wall and that no tile less than 1/2 width is used. Do not interrupt tile pattern

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**TILE**

through openings.

- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.
- E. Form internal angles square and external angles bullnose.

3.4 INSTALLATION - WALL TILE

- A. Wall Tile: Over cementitious backer units on studs, install in accordance with TCA Handbook Method W244C-07, using membrane at toilet rooms.

3.5 CLEANING

- A. Clean tile and grout surfaces.

3.6 PROTECTION OF FINISHED WORK

- A. Do not permit traffic over finished floor surface for 72 hours after installation.
- B. Cover floors with Kraft paper and protect from dirt and residue from other trades.
- C. Where floor will be exposed for prolonged periods cover with plywood or other similar type walkways

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

**SECTION 09 9113  
EXTERIOR PAINTING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes surface preparation and the application of paint systems on exterior substrates listed in part, 3.6 Exterior Painting Schedule.
- B. Related Requirements:
  - 1. Section 09 9123 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.

**1.3 DEFINITIONS**

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 2: Not more than 10 units at 60 degrees and 35 units at 85 degrees, according to ASTM D 523
- C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.
- H. EG: Ethylene Glycol. Ethylene glycol is listed as a hazardous air pollutant (HAP) by the U.S. EPA.
- I. Blocking: Two painted surfaces sticking together such as a painted door sticking to a painted jamb.

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EXTERIOR PAINTING**

- J. RAVOC: Reactivity adjusted VOC 'Reactivity' means the ability of a VOC to promote ozone formation.
- K. PDCA: Painting & Decorating Contractors of America [www.pdca.org](http://www.pdca.org)
- L. SSPC: Scopes of SSPC Surface Preparation Standards and Specifications. [www.sspc.org](http://www.sspc.org).
- M. Green Wise: Green Wise products are tested in an ISO accredited laboratory to meet environmentally determined performance standards established by Coatings Research Group, Inc.
- N. Dunn-Edwards Conformance Chart: [DE CONFORMANCE TABLE](#)

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
  - 1. Submit Samples on rigid backing, no smaller than 7 inches by 10 inches (177.8 mm by 254 mm) or larger than 8.5 inches by 11 inches.
  - 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.
- D. 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. (3.8 L) of each material and color applied.

**SECTION 09 9113  
EXTERIOR PAINTING**

1.6 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. 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 degrees F (7 degrees C) or more than 120 degrees F (49 degrees 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 in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; or at temperatures less than 5 degrees F (3 degrees C) above the dew point; or to damp or wet surfaces.
- C. 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 9113  
EXTERIOR PAINTING**

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Basis-of-Design Product: Provide products listed from Dunn-Edwards Corporation

**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 materials that comply with VOC limits of authorities having jurisdiction.

- C. Colorants: The use of colorants containing hazardous chemicals, such as ethylene glycol, is prohibited.

- D. Colors: As selected by the Architect.

1. Indicate a percentage of the surface area that 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. Owner may engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will comply with requirements to use compatible products and systems as described in Paragraph 2.2.A. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

**SECTION 09 9113  
EXTERIOR PAINTING**

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  - 1. Concrete: 12 percent.
  - 2. Masonry (Clay and CMU): 12 percent.
  - 3. Wood: 15 percent.
  - 4. Portland Cement Plaster: 12 percent.
  - 5. Gypsum Board: 12 percent.
- C. Portland Cement Plaster Substrates: Verify that plaster is fully cured, including pH testing to determine that alkalinity is within limits established by the manufacturer.
- D. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- E. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- F. Proceed with coating application only after unsatisfactory conditions have been corrected.
  - 1. Application of coating indicates acceptance of surfaces and conditions.

**3.2 PREPARATION**

- A. Comply with manufacturer's written instructions.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

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1. Remove incompatible primers and re-prime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.
- G. Shop Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop primed surfaces.

### 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
  1. Use applicators and techniques suited for paint and substrate indicated.
  2. The number of coats scheduled is the minimum number of coats required. Additional coat(s) shall be applied at no additional cost to the Owner, to completely hide base material, provide uniform color, and to produce satisfactory finish results.
  3. Apply coatings without thinning except as specifically required by label directions or required by these specifications. In such cases, thinning shall be the minimum reduction permitted.
  4. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
  5. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
  6. Paint entire exposed surface of window frames and sashes.
  7. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  8. Priming may not be required on items delivered with prime or shop coats, unless otherwise specified. Touch up prime coats applied by others as required ensuring an even primed surface before applying finish coat.
- 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.

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EXTERIOR PAINTING**

- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. 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 at a high dry film build. Block filler shall be back-rolled to eliminate voids and reduce the majority of the masonry profile depth.
- F. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
  - 1. Paint the following work where exposed to view:
    - a. Equipment, including panelboards and switch gear.
    - b. Uninsulated metal piping.
    - c. Uninsulated plastic piping.
    - d. Pipe hangers and supports.
    - e. Metal conduit.
    - f. Plastic conduit.
    - g. Tanks that do not have factory-applied final finishes.
    - h. Other items as directed by the Architect.

**3.4 FIELD QUALITY CONTROL**

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
  - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
  - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

**3.5 CLEANING AND PROTECTION**

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- 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.

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EXTERIOR PAINTING**

- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

**3.6 EXTERIOR PAINTING SCHEDULE**

**A. Concrete Substrates, Masonry, Clay, Stucco, Non-Traffic Surfaces:**

1. Premium Latex System:

- a. Prime Coat: Primer, alkali resistant, waterbased, interior/exterior, Dunn-Edwards, Eff-Stop Select [ESSL00](#).
- b. Intermediate Coat: Latex, exterior, matching topcoat.
- c. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Spartashield [SSHL50](#) 100% acrylic, (Gloss Level 5).

**B. CMU Substrates:**

1. Premium Latex System:

- a. Prime Coat: Block filler, latex, interior/exterior, Dunn-Edwards, Smooth BLOCFIL Select [SBSL00](#) or Eff-Stop Select [ESSL00](#).
- b. Intermediate Coat: Latex, exterior, matching topcoat.
- c. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Spartashield [SSHL50](#) 100% acrylic, (Gloss Level 5).

**C. Ferrous Metal Substrates:**

1. Premium Latex over a Waterborne Alkyd Primer System:

- a. Prime Coat: Primer, rust inhibitive, waterborne alkyd, interior/exterior, Dunn-Edwards, Bloc-Rust Premium [BRPR00](#) Series or Enduraprime rust preventative primer [ENPR00](#).
- b. Intermediate Coat: Latex, exterior, matching topcoat.
- c. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Spartashield [SSHL50](#) 100% acrylic, (Gloss Level 5).

**D. Wood Substrates:**

1. Premium Latex System:

- a. Prime Coat: Primer, waterbased, exterior, Dunn-Edwards, Ultra-Grip Premium [UGPR00](#) or EZ-Prime Premium [EZPR00](#)
- b. Intermediate Coat: Latex, exterior, matching topcoat.
- c. Topcoat: Latex, exterior, semi-gloss, Dunn-Edwards, Spartashield [SSHL50](#) 100% acrylic, (Gloss Level 5).

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 055000 "Metal Fabrication" for shop priming of metal substrates with primers specified in this Section.
  - 2. Section 099113 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.

**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. Gloss Level 6: 70 to 80 units at 60 degrees.
- G. Gloss Level 7: More than 80 units at 60 degrees.
- H. Blocking: Two painted surfaces sticking together such as a painted door sticking to a painted jamb.
- I. 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.

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- J. 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).
- K. EG: Ethylene Glycol. Ethylene glycol is listed as a hazardous air pollutant (HAP) by the U.S. EPA.
- L. PDCA: Painting & Decorating Contractors of America [www.pdca.org](http://www.pdca.org) .
- M. RAVOC: Reactivity adjusted VOC. "Reactivity" means the ability of a VOC to promote ozone formation
- N. SSPC: The Society for Protective Coatings publishes Scopes of SSPC Surface Preparation Standards and Specifications [www.sspc.org](http://www.sspc.org) .
- O. 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 280 mm).
  - 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.

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INTERIOR PAINTING**

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

- 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.

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- C. 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.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

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

**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 comply 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. Owner may engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
- 2. Testing agency will perform tests for compliance with product requirements.
- 3. Owner may direct Contractor to stop applying 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. Contractor will comply with requirements to use compatible products and systems as described in Article 2.2. Contractor will

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INTERIOR PAINTING**

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. Concrete: 12 percent.
  - 2. Masonry (Clay and CMU): 12 percent.
  - 3. Wood: 15 percent.
  - 4. Gypsum Board: 12 percent.
  - 5. Plaster: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured, including pH testing to determine that alkalinity is within limits established by the manufacturer.
- E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.
- F. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- G. 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 similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

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- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and re-prime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions, including pH testing to determine that alkalinity is within limits established by the manufacturer.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.
- G. Shop Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop primed surfaces.
- H. Galvanized Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Aluminum Substrates: Remove loose surface oxidation.
- J. 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 smoothly when dried.
- K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

**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.

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3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
  4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- 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.
- 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 at a high dry film build. Block filler shall be back-rolled to eliminate voids and reduce the majority of the masonry profile depth.
- F. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed in equipment rooms:
    - a. Equipment, including panelboards and switch gear.
    - b. Uninsulated metal piping.
    - c. Uninsulated plastic piping.
    - d. Pipe hangers and supports.
    - e. Metal conduit.
    - f. Plastic conduit.
    - g. Tanks that do not have factory-applied final finishes.
    - h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    - i. Other items as directed by the architect.
  2. Paint the following work where exposed in occupied spaces:
    - a. Equipment, including panelboards.
    - b. Uninsulated metal piping.
    - c. Uninsulated plastic piping.
    - d. Pipe hangers and supports.
    - e. Metal conduit.

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- f. Plastic conduit.
  - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
  - h. Other items as directed by the Architect.
3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

**3.4 FIELD QUALITY CONTROL**

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
- 1. Contractor shall touch up and restore painted surfaces damaged by testing.
  - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

**3.5 CLEANING AND PROTECTION**

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- 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:
    - a. Prime Coat: Primer sealer, latex, interior, Dunn-Edwards, Vinylastic Select [VNSL00](#).
    - b. Intermediate Coat: Latex, interior, matching topcoat

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- 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. 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, flat, Dunn-Edwards, Spartazero [SZRO10](#), (Gloss Level 1).  
Or
    - d. Topcoat: Latex, interior, semi-gloss, Dunn-Edwards, Spartawall [SWLL50](#), (Gloss Level 5).

END OF SECTION

## SECTION 10 1400 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 08 1113, Hollow Metal Doors and Frames.
  - 2. Section 09 1113, Exterior Painting
  - 3. Section 09 1123, Interior Painting

#### 1.2 SUBMITTALS

- A. Make submittals in accordance with section 01 3300.
- 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 signs.

#### 1.3 QUALITY ASSURANCE

- A. Manufacturers shall have been regularly engaged in manufacturing identifying devices for minimum of 5 years.
- B. Pre-Installation Conference: Notify District project manager 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 event of damage, immediately make necessary repairs and replacements.

**SECTION 10 1400  
SIGNAGE**

**PART 2 - PRODUCTS**

**2.1 MANUFACTURE**

- A. Products of 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

## SECTION 10 1400 SIGNAGE

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. 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 Raised characters shall comply with CBC 11B-703.2.

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 to Section 2.3, C below.

#### A. Visual Characters: 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.

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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 to CBC 11B-703.5.8 and 11B-703.5.9.
- 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.
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. Pictograms:** In conformance to CBC 11B-703.6. Pictograms shall have a field height of 6 inches minimum. Characters and Braille shall not be located in the pictogram field.
1. **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.
  2. **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.
- D. 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.

## SECTION 10 1400 SIGNAGE

- E. Mounting Locations and Height: Signs with tactile characters shall be as indicated on the drawings and in conformance to 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. Multiple-Occupancy restrooms shall be provided with geometric symbols and wall mounted pictograms with text descriptors.
- B. 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. Male Restroom Door Symbol: 1/4-inch-thick equilateral triangle with edges 12 inches long, with vertex pointing upward, the triangle symbol shall contrast with the door, either light on a dark background or dark on a light background. A male silhouette shall appear within the equilateral triangle in contrasting color to it.

## **SECTION 10 1400 SIGNAGE**

3. Female Restroom Door Sign: 1/4-inch-thick circle 12-inch diameter, the circle symbol shall contrast with the door, either light on a dark background or dark on a light background. A female silhouette shall appear within the circle in contrasting color to it.
  4. 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 ¼ inch maximum.
  5. 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.
- C. Room Identification for Multiple-Occupancy Restrooms: Provide a room identification sign, including a pictogram of the International Symbol of Accessibility on a side. Restroom names shall be "Women" or "Men." Characters, Braille, pictograms and mounting locations and height shall be in conformance to section 2.3. Size and field verify to replace old sign with new type per detail shown on plans.

### **PART 3 – EXECUTION**

#### **3.1 EXAMINATION**

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

#### **3.2 INSTALLATION**

- A. Interior Identification Signs and Interior Directional Signs:
  1. Anchor signs to wall using 4 tamperproof, round head screws, one at each corner of sign. Furnish plastic anchors.
  2. In addition to screws, signs shall be secured to wall with high-bond two-faced tape.
  3. For installation on glass, fasten sign to glass with very high bond double faced tape. On opposite side of glass, anchor matching backplate to glass with very high-bond double-faced tape.
- C. Geometric Signs: Toilet room signs shall be anchored to doors with 3 tamperproof countersunk screws, designed for anchoring to material of wall.

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SIGNAGE**

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 2115  
TOILET COMPARTMENTS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Solid phenolic toilet compartments, urinal screens, hardware, and vision screens.
- B. Related Sections:
  - 1. Division 01 – General Requirements.
  - 2. Section 06 1000 – Rough Carpentry.
  - 3. Section 10 2813 – Toilet Accessories.

**1.2 DESIGN REQUIREMENTS**

- A. Compartments: Floor supported overhead braced type units consisting of solid phenolic pilasters, panels, and doors; plated steel leveling devices with stainless steel covers; and stainless-steel fittings, hardware, and fastenings.
- B. Urinal Screens: Floor supported and wall hung type consisting of solid phenolic screen panels and plated steel leveling devices with stainless steel covers, stainless steel fittings and fastening.

**1.3 SUBMITTALS**

- A. Section 01 3300 - Submittal Procedures: Procedures for submittals.
  - 1. Product Data: Submit manufacturer's data sheets for each product specified.
  - 2. Shop Drawings: Submit manufacturer's shop drawings for each product specified, including the following:
    - a. Plans, elevations, details of construction and attachment to adjacent construction.
    - b. Show anchorage locations and accessory items.
    - c. Verify dimensions with field measurements prior to final production of toilet compartments.
  - 3. Material Samples:
    - a. Submit full range of Samples of phenolic chips for initial color selection. Chips shall be at least 2-inch by 3-inch.
    - b. Submit Samples of hardware and fasteners.
  - 4. Closeout documents: Submit operation and maintenance data and warranty.

**SECTION 10 2115  
TOILET COMPARTMENTS**

1.4 QUALITY ASSURANCES

- A. American Society for Testing and Materials (ASTM):
  - 1. ASTM A 167 - Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  - 2. ASTM E-84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 3. Chemical Resistance: Panels to meet or exceed Scientific Equipment Furniture Association's (S.E.F.A.) list of 49 standard chemicals.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials and products in strict compliance with manufacturer's instructions and recommendations. Protect from damage.

1.7 WARRANTY

- A. Toilet Compartment Manufacturer shall provide a 25-year material warranty for solid phenolic panels and hardware.

PART 2 - PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
  - 1. Bobrick Washroom Equipment, Inc.
  - 2. Capitol Partitions.
  - 3. Comtec Industries.
  - 4. Metpar Corporation.
  - 5. Scranton Products.
  - 6. Or approved equal.

2.2 MATERIALS

- A. Stiles, Panels, Doors, and Screens, Duraline Series, 1080 Series.
  - 1. Solid phenolic material constructed of solidly fused plastic laminate with matte-finish melamine surfaces, colored face sheets, and black phenolic resin core that are integrally bonded. Edges shall be black.
  - 2. Door & Panel Height: 58"

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TOILET COMPARTMENTS**

3. Floor Clearance: 12"
  4. Color: as noted on Drawings.
  5. Option to provide gap-Free Privacy Design.
  6. Finish Thickness:
    - a. Stiles and doors shall be 3/4 inch.
    - b. Panels shall be 1/2 inch.
- B. Heavy Duty Stainless Steel Hardware
1. All hardware to be Institutional Hardware, 18-8, type-304 stainless steel with satin finish.
  2. All hardware concealed inside compartments with the exception of out-swinging doors.
- C. Latch with Vandal-Resistant Option
1. Sliding door latch 14 gauge and slide on nylon track.
  2. Sliding door latch shall require less than 5-pound force to operate. Twisting latch operation will not be acceptable.
  3. Latch track attached to door by flathead machine screws into factory installed threaded brass inserts.
  4. Latch handle shall have rubber bumper to act as door stop.
  5. Latch shall allow door to be lifted over 8-gauge keeper for emergency access.
  6. Metal-to-metal connection shall withstand a direct pull of over 1000 pounds per screw.
  7. ADA approved latch.
- D. Hinges Cam with Vandal-Resistant Option
1. Heavy gauge with stainless steel satin finish.
  2. All doors equipped with self-closing hinge.
  3. Threaded inserts are factory installed for securing hinges. Theft-resistant, stainless steel pin-in-head, Torx screws are furnished for door hardware. Balanced hinge is adjustable to hold door of unoccupied toilet compartment partially open or fully closed.
  4. Door furnished with two 11-gauge vinyl-coated door stops to resist door from being kicked out of compartment.
  5. Door stops and keeper secured with stainless steel, one-way, machine screws from inside of compartment to threaded brass inserts.
- E. Mounting brackets 18-gauge stainless steel and extend full height of panel. U-channels furnished for panel to stile mounting. Angle brackets furnished for stile to wall and stile to panel mounting. Angle brackets furnished for panel to wall mounting.
- F. Leveling Device 3/16 inch hot rolled steel bar; chromate-treated and zinc-plated; through-bolted to base of solid phenolic stile.
- G. Stile Shoe one-piece, 4 inch high, type-304, 22-gauge stainless steel with satin finish. Top shall have 90 degree return to stile. One-piece shoe capable of adapting to 3/4 inch

**SECTION 10 2115  
TOILET COMPARTMENTS**

or 1 inch stile thickness and capable of being fastened (by clip) to stiles starting at wall line.

- H. Overhead Braced Headrail satin finish, extruded anodized aluminum 0.125 inches thick with anti-grip profile.

**PART 3 – EXECUTION**

**3.1 EXAMINATION**

- A. Section 01 7300 – Execution: Verification of existing conditions before starting work.
  - 1. Check areas scheduled to receive compartments for correct dimensions, plumbness of walls, and soundness of surfaces that would affect installation of mounting brackets.
  - 2. Verify spacing of plumbing fixtures to assure compatibility with installation of compartments.
  - 3. Do not begin installation of compartments until conditions are satisfactory.

**3.2 INSTALLATION**

- A. Install compartments rigidly, straight, plumb, and level and in accordance with manufacturer's installation instructions.
- B. Installation methods shall conform to manufacturer's recommendations for backing and proper support.
- C. Conceal evidence of drilling, cutting, and fitting to room finish.
- D. Maintain uniform clearance at vertical edge of doors.

**3.3 ADJUSTMENT AND CLEANING**

- A. Adjust hardware for proper operation after installation.
- B. Set hinge cam on in-swinging doors to hold doors open when unlatched.
- C. Set hinge cam on out-swinging doors to hold unlatched doors in closed position.
- D. Clean exposed surfaces of compartments, hardware, and fittings.

**END OF SECTION**

## SECTION 10 2813 TOILET ACCESSORIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Toilet Accessories.
  - 2. Attachment hardware.
- B. Related Documents: The Contract Documents, as defined in the General Conditions, 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 06 1000 - Rough Carpentry: Placement of backing and blocking for attachment of accessories.

#### 1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
  - 1. ASTM A 123 - Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - 2. ASTM A 167 - Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  - 3. ASTM A 366 - Specification for Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.

#### 1.3 SUBMITTALS

- A. Section 01 3300 - Submittal Procedures: Procedures for submittals.
  - 1. Product Data: Data for each accessory describing size, finish, details of function, and attachment methods.

#### 1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Conform to California Building Code, 2016 Edition and Federal ADA for mounting heights and locations of accessories.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 6000 - Product Requirements: Transport, handle, store, and protect products.

**SECTION 10 2813  
TOILET ACCESSORIES**

- B. Deliver accessories in original labeled packaging, bearing manufacturer's name and type of accessory.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Subject to compliance with project requirements, manufacturers offering specified items which may be incorporated in the Work include the following:
  - 1. American Specialties Company,
  - 2. Bobrick Washroom Equipment,
  - 3. Bradley Corporation,
  - 4. McKinney Parker,
  - 5. Or approval equal as permitted in Section 01 6000 - Product Requirements: Product options and substitutions.

**2.2 MATERIALS**

- A. Sheet Steel: ASTM A 366.
- B. Galvanized Sheet Steel: ASTM A 366, ASTM A 123 to 1.25 ounces per square yard.
- C. Stainless Steel Sheet: ASTM A167, Type 304.
- D. Fasteners, Screws, and Bolts: Stainless Steel, tamper-proof.
- E. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

**2.3 MANUFACTURED UNITS – See Drawings.**

**2.4 FABRICATION**

- A. Weld and grind smooth joints of fabricated components.
- B. Form exposed surfaces from single sheet of stock, free of joints. Form surfaces flat without distortion. Maintain surfaces without scratches or dents.
- C. Fabricate grab bars of tubing, free of visible joints, return to wall with end attachment flanges.
- D. Shop assembles components and package complete with anchors and fittings.

**SECTION 10 2813  
TOILET ACCESSORIES**

- E. Provide steel anchor plates, adapters, and anchor components for installation.
- F. Back paint components where contact is made with building finishes to prevent electrolysis.

**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.
  - 1. Verify correct location of opening in wall for recessed accessories.
  - 2. Verify that attachment blocking and backing plates are in place in the correct location for accessory connections.
- 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 District.

**3.2 PREPARATION**

- A. Deliver inserts and rough-in frames to site for scheduled installation.
- B. Provide and use templates and rough-in measurements as required.

**3.3 INSTALLATION**

- A. Install fixtures, accessories, and items in accordance with manufacturer's instructions, and as indicated on Drawings. Use tamper-proof fasteners.
- B. Install plumb and level, securely and rigidly anchored to substrate.

**3.4 ADJUSTING AND CLEANING**

- A. Adjust accessories for proper operation and verify mechanisms function smoothly.
- B. Remove temporary labels and protective coatings. Clean and polish exposed surfaces.

**SECTION 10 2813  
TOILET ACCESSORIES**

Payment for all items of work identified under Division 10 of the plans and these specifications shall be based on the lump sum pricing for the various bid items identified as Building Specialties on the Bid Schedule.

END OF SECTION

**SECTION 11 4000  
FOOD SERVICE EQUIPMENT AND FIXTURES**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Work of this section, as shown or specified, shall be provided by the Contractor and shall be in accordance with the requirements of the Contract Documents.
- B. Work includes all labor, materials, equipment, accessories, and appliances required to furnish and install food service equipment as indicated on the drawings and herein specified.
- C. Related work in other Sections:
  - 1. Section 06 1000 – Rough Carpentry.
  - 2. Division 22 - Plumbing.
  - 3. Division 26 - Electrical.
- D. Contractor shall provide cutting of holes in equipment or fixtures for pipes and drains as required for their installation.
- E. Contractor shall provide adequate raceways and accesses in fixtures for the plumbing lines and for Electrical Contractor to install his work. Where there is neglect by the Contractor to provide for such space, he shall make the necessary revisions/repairs to the work without expense to the District. Cutting and patching required by such work shall be reworked to its original finish.
- F. Contractor shall provide and locate outlet boxes, receptacles, device plates, and switches, junction boxes, where they are a part of the fixture and indicated on equipment electrical layout sheets. All other electrical work shall be furnished and installed by the Electrical Contractor, including installation of conduits in fixtures, connection to boxes, and the wiring of electrical outlets and equipment.
- G. The drawings indicate the desired basic arrangement and dimensions of the equipment; minor deviations therefore may be substituted for approval according to Section 01 2513, and provided basic requirements are met and no major rearrangements of services to the equipment are required to affect the proposed alteration, such deviations shall be made without expense to District.
- H. The Contractor shall be responsible for the satisfactory operation of the assembled equipment. Tests of the installed equipment shall be required. Defects or deficiencies noted as a result of tests shall be corrected to the entire satisfaction of the District and/or his agent at the expense of the Contractor. The Contractor shall consult the mechanical and electrical drawings and their accompanying specifications to determine additional requirements of the work and shall cooperate with all trades to insure a completely satisfactory installation.

**SECTION 11 4000  
FOOD SERVICE EQUIPMENT AND FIXTURES**

- I. Required voltages, cycles and phase and electrical requirements shall be checked before ordering equipment.

**1.2 SUBMITTALS**

- A. All submittals shall be made according to Section 01 3300 and as described herein.
- B. Submit the following for each item:
  - 1. The Contractor shall submit for approval two (2) copies of 1/4" scale plans showing location of all plumbing, and electrical with elevations and sections of all special equipment for use of the respective trades. The Contractor shall be responsible for the accuracy of the outlets in the building in connection with his work. One copy with approved corrections shall be returned to the Contractor who shall revise such drawings and re-submit two (2) additional copies for final approval.
  - 2. The Contractor shall submit two (2) copies for approval of 3/4" (20mm) scale shop drawings covering all items of work included; detail drawings shall show all dimensions and all details of construction installation and the relation to adjoining and related work; all reinforcements, anchorages and other work required for complete installation. One copy with approval or corrections shall be returned to the Contractor who shall revise such drawings and resubmit two (2) additional copies for final approval. (Scale: 3/4" (20mm) and larger, as required.) Shop drawing blueprints shall not be larger than 30" x 42" (760 x 1060mm).
- C. After final approval Contractor shall print and distribute four (4) copies of shop drawings to other interested parties, or as directed by the District.
- D. Approval of such drawings shall not relieve the Contractor from responsibility for any deviations from the drawings and specifications unless such deviations are approved in writing by the District or his agent.

**1.3 WORK NOT INCLUDED**

- A. Plumbing and electrical trims, including stainless steel cover plates for outlets and pull boxes, and connections shall be furnished by the respective trades involved, unless otherwise specified.
- B. Connections to the mechanical and electrical services are specified under the General Contractor specifications and shall not be considered as part of the work of this section, unless specifically indicated otherwise on drawings or specifications.

**1.4 QUALITY ASSURANCE**

**SECTION 11 4000**  
**FOOD SERVICE EQUIPMENT AND FIXTURES**

- A. All Food Service Equipment and Fixtures shall be provided and installed using experienced, skilled workmen to the highest standard of workmanship and shall be free of any defects due to faulty workmanship.
- B. All work and materials shall conform to the drawings and specifications; any changes or deviations in materials or methods must be approved by the Architect.
- C. Food Service Equipment and Fixtures shall meet requirements of local and state codes where applicable. Comply with all laws, ordinances, rules and regulations and orders of any public authority having jurisdiction over this part of the Work.
- D. The Contractor shall be responsible for taking accurate job-site measurements for all dimensions related to the Work.
- E. The Contractor shall examine all conditions pertaining to the installation of Food Service Equipment and Fixtures and shall provide all coordination as required to achieve the proper and timely completion of the installation.
- F. The Contractor will not change brands of materials during the course of the work unless approved by the Architect.

**PART 2 - PRODUCTS**

**2.1 EQUIPMENT**

- A. All equipment and fixtures shall be provided as indicated on the drawings, equipment schedule, and specifications and as described herein.
- B. All electrically operated or heated equipment shall be in full accordance with and will conform to the latest standard of the National Board of Fire Underwriters, National Electrical Manufacturer's Association and Underwriters Laboratories, Inc. Where applicable standards have been set up by that agency and are acceptable to authorities having jurisdiction.
- C. All steam-heated equipment shall be manufactured in accordance with A.S.M.E. code requirements and shall carry the A.S.M.E. stamp.
- D. Food service equipment, electric commercial cooking and warming equipment and soda fountain equipment shall conform to standards of the National Sanitation Foundation standards.

**SECTION 11 4000  
FOOD SERVICE EQUIPMENT AND FIXTURES**

- E. "Cord and plug" shall mean a sufficient length (from item to receptacle) of grease resistant insulated cord with cap of sufficient size and capacity to carry the connected load. Plug shall match receptacles.
- F. Contractor to verify all pertinent data with District before ordering all items listed in the construction documents Food Service Specialty Equipment Schedule.
- G. Contractor to verify the exact voltage and phase to be used prior to ordering any equipment.

**PART 3 - EXECUTION**

**3.1 DELIVERIES AND STORAGE**

- A. The equipment and fixtures shall be delivered and installed on schedule.
- B. The Contractor shall submit to the District within five (5) days of execution of contract, a Progress Schedule, showing the order of expected progress of the job with the expected starting and completion dates of the various parts of the job.
- C. Insofar as possible, work shall be fabricated and finished in the shop and delivered completely to the job site ready to set in place.
- D. Follow manufacturers' recommendations for all handling and storage of equipment.

**3.2 INSTALLATION**

- A. Manufacturer's directions shall be followed in all cases where manufacturers of articles used in this contract furnish directions or prints covering points not shown on the drawings or specifications.
- B. Installation of equipment shall be in strict accordance with manufacturer's approved shop and installation drawings.
- C. State and local health regulations and ordinances and minimum standards of the National Sanitation Foundation Standards Nos. 1, 2, 3, and 4 shall be fully adhered to and other additional requirements which might develop shall be included to insure a complete sanitary installation.
- D. All equipment and fixtures installed against walls shall be sealed off with mastic approved by the Health department to prevent vermin harborage.

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**FOOD SERVICE EQUIPMENT AND FIXTURES**

- E. Contractor shall provide a competent representative to be present when installation is complete and ready to put into operation, and to instruct District's employees in the proper use and maintenance of items and to set up a maintenance schedule.
- F. Repair damage done to the premises as a result of installation of equipment and fixtures.
- G. During and upon completion of work, remove excess materials, rubbish, and debris from site. Fixtures and equipment shall be wiped clean and floors swept broom clean.

END OF SECTION

**SECTION 22 0500**  
**COMMON WORK RESULTS FOR PLUMBING**

**PART 1 – GENERAL**

**1.1 SUMMARY**

**A. Section Includes:**

1. This Section provides the basic plumbing requirements that apply to the Work of Division 22.

**B. Related Requirements:**

1. Division 01: General Requirements.
2. Division 22: Plumbing
3. Division 26: Electrical.

**1.2 REGULATORY REQUIREMENTS**

- A.** Current federal Safe Drinking Water Act (SDWA) regulations require the furnishing of lead-free pipe, solder, and flux in the installation or repair of plumbing in non-residential facilities connected to public drinking water systems. Under this regulation, solders and flux are considered lead-free when they contain 0.2 percent lead or less. Under California regulations pipes and pipe fittings are considered lead-free when they contain 0.25 percent lead or less as defined in California Assembly Bill 1953 (AB 1953). No pipe, pipe fittings, or any other fitting or fixture intended to convey or dispense water for human consumption by drinking or cooking is allowed in the domestic plumbing system, if they do not meet the low lead definition of AB 1953. Weighted average lead content of the wetted surface area of pipes, fittings and fixtures may not exceed 0.25 percent.

1. Provide lead-free water pipe, solder, and flux materials that meet the standards as outlined by the federal SDWA regulations and California AB 1953 if installed in drinking water system.
2. Collect pipe, solder, and flux material samples as required by the Project Inspector. Test samples shall be delivered to an Owner designated testing laboratory for testing of lead content.
  - a. Test samples for lead content by the atomic absorption spectrophotometry method.
3. Materials found not conforming to SDWA and California AB 1953 regulations shall be deemed defective Work and shall be replaced with lead-free materials.
4. Comprehensive testing of the remaining materials for their lead content shall be performed as required by the Project INSPECTOR.

- A.** Materials, fabrication, equipment, and installation shall comply with industry standards and code requirements. Where manufacturer's recommendations exceed industry standards, the manufacturer's recommendation must establish

**SECTION 22 0500**  
**COMMON WORK RESULTS FOR PLUMBING**

the minimum standard. As a minimum, standards from the following organizations shall apply:

1. ANSI - American National Standards Institute.
  2. ASME - American Society of Mechanical Engineers.
    - a. ASME Boiler and Pressure Vessel Code.
    - b. ASME B31 - Standards for Pressure Piping.
  3. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers.
  4. ASTM - American Society for Testing and Materials.
    - a. ASTM A53 Specification for Welded and Seamless Pipe.
  5. AWWA - American Water Works Association.
  6. CSA - Canadian Standards Association.
  7. FM Global - Factory Mutual Global
  8. IAPMO - International Association of Plumbing and Mechanical Officials.
  9. NFPA - National Fire Protection Association.
  10. OSHA - Occupational Safety and Health Administration.
  11. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association.
  12. UL - Underwriters Laboratories Inc.
  13. Intertek (ETL Certification).
- B. Materials, fabrication, equipment, and installation shall comply with federal, state, and local codes including, but not limited to, the following:
1. CBC, California Building Code, and CMC, California Plumbing Code.
    - a. Latest edition as adopted by the City, the County, and the State of California including amendments effective on the Effective Date of the Contract.
  2. California Code of Regulations, Title 8, Industrial Relations, Division 1, Chapter 4, Division of Industrial Safety.
  3. OSHA - Occupational Safety and Health Administration.
  4. CDPH - California Department of Public Health.
  5. SCAQMD - South Coast Air Quality Management District.
- C. Specifications or Drawings shall not be construed to permit deviation from the requirements of governing codes unless approval has been obtained from legally constituted authorities having jurisdiction, and the Architect. The Contract Documents may contain more stringent requirements than those legally required.
- D. Permits and Fees: Refer to the General and Supplementary Conditions.

**SECTION 22 0500  
COMMON WORK RESULTS FOR PLUMBING**

1.3 SUBMITTALS

- A. Provide submittals in accordance with Section 01 3300: Submittal Procedures and with specific requirements of Division 22 sections, as applicable.
- B. The above information shall become the basis for inspecting and testing materials and actual installation procedures performed in the Work.
- C. Shop Drawings: Submit one additional copy when control diagrams having line voltage connections are indicated. Shop Drawings shall be specifically prepared for the Work of this Project. Drawings prepared in accordance with requirements of Section 01 3113: Project Coordination and Section 01 3300 may be provided by the Architect to serve as a background for the Shop Drawings. Shop Drawings shall comply with the requirements of Section 01 3113 and Section 01 3300 and shall indicate at a minimum:
  - 1. Complete system layout of equipment, components, plumbing fixtures, piping, indicating service clearances, and pipe sizes, fitting types and sizes and pipe elevations, distances of pipes and equipment from building reference points and hanger support locations. The above items shall be coordinated on the shop drawings according to the requirements of Section 01 3113.
  - 2. Schedule and description of equipment, piping, and fittings.

1.4 PROJECT RECORD DOCUMENTS

- A. Comply with provisions of Section 01 7700: Contract Closeout.
- B. Project Record Drawings:
  - 1. Provide a complete set of plumbing drawings in AutoCAD and, if available, BIM, complete with external reference drawings, fonts, blocks, and plotter pen color/line thickness settings on CD-ROM. Also submit one set of full-size reproducible plots on vellum and 3 sets of prints.
  - 2. Before Contract Completion, deliver corrected and completed prints to the District. Delivery of project record documents to the District does not relinquish responsibility of furnishing required information omitted from project record documents.
- C. Operation and Maintenance Manuals:
  - 1. Submit two copies of operation and maintenance manuals in required form and content. If no revisions are required, furnish one additional copy. If revisions are required, one copy shall be returned with instructions for changes; perform such changes and return three copies of manuals. Manuals shall be bound in accordance to Section 01 7700. Deliver manuals to the District. Submit an electronic copy of the entire manual in PDF file format.
  - 2. Contents of Manual:

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**COMMON WORK RESULTS FOR PLUMBING**

- a. Title sheet with Project name, including names, addresses and telephone number of Contractor, installer, and related equipment suppliers.
- b. Manufacturer's operating instructions including, but not limited to, the following:
  - 1) Identification of components and controls.
  - 2) Trouble shooting checklist and guidelines.
  - 3) Recommendations for optimum performance.
  - 4) Warnings and safety precautions on improper or hazardous operational procedures or conditions
- c. Manufacturer's product data and parts and maintenance booklet for each item of equipment furnished under Division 22 that includes the following as a minimum:
  - 1) Manufacturer's model, identification, and serial numbers.
  - 2) Exploded view of assembly drawings identifying each component or part with the relevant part number.
  - 3) Directory of manufacturer's representatives, service contractors, and part distributors.
  - 4) Maintenance and trouble-shooting instructions, including schedule for preventive maintenance, periodic inspection, and cleaning criteria.
- d. Project Record Drawings: Complete set of plumbing, fire protection and control system drawings in 50 percent reduced print format shall be furnished with the manual. Submit the above record drawings on CD-ROM in AutoCAD and, if available, BIM, complete with external reference drawings, fonts, blocks, and plotter pen color/line thickness settings.
- e. Testing, Adjusting, and Balancing reports: Submit as specified in Section 23 0593.
- f. South Coast Air Quality Management District (SCAQMD) permits to install and operate boilers, water heaters and other fuel burning equipment and third-party source test reports as required by SCAQMD to allow start-up and operation of equipment.
- g. County industrial waste permits.
- h. Valve directory complete with location, function, size, and model of each valve with reference to the project record drawings.
- i. Equipment and component identification chart complete with location, function, size, and model of each equipment or component with reference to the project record drawings.

**SECTION 22 0500  
COMMON WORK RESULTS FOR PLUMBING**

1.5 COORDINATION

- A. Contract Documents indicate extent and general arrangement of Work under Division 22. Contractor shall coordinate work in accordance with Section 01 3113 requirements and make adjustments as required to provide maximum headroom, a neat arrangement to keep passageways and openings clear to provide accessibility and provisions for maintenance, and to meet code requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Storage: Deliver materials to Project site in their original unopened containers with labels intact and legible at time of delivery. Store in strict accordance with manufacturer's recommendations.
- B. Do not store plastic pipe or materials in direct sunlight.

1.7 PRELIMINARY OPERATION

- A. District may require any portion of plumbing Work to be operated before Substantial Completion. Such operation shall be in addition to regular tests, demonstrations and instructions required under the Contract Documents, and shall be performed as required.
- B. Notify the INSPECTOR at least 24 hours in advance of lighting or re-lighting pilots.

1.8 TRAINING OF OWNER PERSONNEL

- A. Training of Owner's personnel shall include:
  - 1. A minimum of 4 hours of on-site overview of the overall Plumbing System.
  - 2. Refer to Division 22 sections for specific training on each of the components of the Plumbing System.
- B. Contract shall include the cost of training Owner operation and maintenance personnel in operating, adjusting, maintenance, troubleshooting, and Project site repair of each component, equipment, or system provided under this Contract.
- C. Operational and maintenance training shall be conducted on the Project site, unless indicated otherwise.
- D. Upon completion of Owner training, a completion certificate indicating the nature of the training and a description of the systems, complete with equipment and component lists shall be issued to each trainee. The certificate should be issued in duplicate with one copy retained by the District.
- E. An attendance sheet with the names and signatures of all participants attending the training shall be submitted to the District and kept as part of the project documents.

1.9 GUARANTEES AND DAMAGE RESPONSIBILITY

- A. Sound of water flowing in piping shall not be transmitted to building structure. Operation of mechanical system must not produce operational sounds that can be heard outside of rooms enclosing apparatus or equipment.

**SECTION 22 0500  
COMMON WORK RESULTS FOR PLUMBING**

**PART 2 – PRODUCTS**

**2.1 MATERIALS AND EQUIPMENT**

- A. Unless otherwise specified, materials and equipment shall be new, in good and clean condition. Equipment, materials, and components shall be of the make; type and model number noted on Drawings or specified. Pieces of equipment of the same type shall be by the same manufacturer.
- B. Whenever an item is listed by a single proprietary name, with or without model number and type, it shall be for purpose of design only, to indicate characteristics and quality desired. Proprietary designation listed on Drawings, or listed first in Specifications, is used as a basis for design to establish a standard for quality and performance and space requirements.
- C. Equipment and materials indicated or required to be installed outdoors shall be of the type that is designed, manufactured, listed, or approved by authorities having jurisdiction for outdoor installation by being resistant to the adverse effects of weather. The additional protective measures against outdoor weather required by the manufacturers' installation instructions and prevalent practice shall be provided.
- D. For substitution of materials or products, refer to the General Conditions.

**PART 3 – EXECUTION**

**3.1 SERVICE INTERRUPTIONS, OFF-SITE, GAS AND WATER**

- A. Schedule Work so there shall be no service interruptions of existing systems or systems during normal hours of operation of affected systems and facilities.
- B. When service interruptions are mandatory, arrange in advance with the District as to time and date of such interruptions.
- C. Systems which are interrupted shall be returned into operation in such manner that they will function as originally intended.

**3.2 CUTTING, NOTCHING, AND BACKING**

- A. Conform to California Building Code, Title 24, Part 2, for notches and bored holes in wood and for pipes and sleeves embedded in concrete and for cuts in steel, as detailed on structural Drawings.
- B. Where pipes pass through or are located within one inch of any construction element, install a resilient pad, ½ inch thick minimum, to prevent contact.
- C. Furnish provisions for recesses, chases, and accesses and provide blocking and backing for proper reception and installation of plumbing Work.

**3.3 LOCATION OF PIPING AND EQUIPMENT**

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- A. Location of piping, apparatus and equipment indicated on the Drawings is approximate and must be altered to avoid obstructions, preserve headroom, and provide free and clear openings and passageways.
- B. Trenches parallel to footings shall not be closer than 18 inches to the face of footings and shall not be below a plane having a downward slope of 2 horizontal to one vertical, from a line 9 inches above bottom of footing.
- C. Pipe in tunnels shall be installed close to one side of tunnel to provide maximum space for passage. Pipe shall not be installed through crawl hole unless otherwise specified or detailed on Drawings.
- D. Place equipment in locations and spaces indicated, disassemble and/or reassemble equipment as required by Project conditions.

**3.4 TESTS AND TESTING**

- A. Tests shall be as required under the applicable sections of Division 22, including this Section.
- B. Additional tests may be required in the case of products, materials, and equipment if:
  - 1. Submitted items are altered, changed, or cannot be determined as exactly conforming to the Contract Documents.
  - 2. Performance testing and results may also be required on certain items which are as specified, including fan, and pump performance.
- C. Piping Tests:
  - 1. Perform tests required to demonstrate that operation of plumbing systems and their parts are in accordance with Specifications covering each item or system, and furnish materials, instruments, and equipment necessary to conduct such tests. Tests shall be performed in presence of the Inspector, and representatives of any governmental agency having jurisdiction. Work shall not be concealed or covered until required results are provided.
  - 2. If required tests are not performed, Owner may provide in accordance with the Contract Documents.
  - 3. Pressure gauges furnished in testing shall comply with CPC. Air shall be bled from lines requiring hydrostatic or water tests.
  - 4. Systems shall be pressure-tested in accordance with pipe testing schedule below. Pipe test shall indicate no loss in pressure after a minimum duration of 4 hours at test pressures indicated. Where local codes require higher test pressures than specified herein for fire sprinkler systems, local codes shall govern.
  - 5. Fuel gas lines shall be first tested with piping exposed, before backfilling trenches or lathing; second with piping in finished arrangement, backfilled and paved where required, and walls finished.

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6. Piping systems may be tested as a unit or in sections, but entire system shall successfully meet requirements specified herein, before final testing by the Inspector.
7. Repair of damage to pipes and their appurtenances or to any other structures resulting from or caused by these tests, shall be provided.

D. Pipe Testing Schedule:

<b>System Tested</b>	<b>Test Pressure (psig)</b>	<b>Test With:</b>
Cast-iron soil, waste and interior downspout, condensate drain from air conditioning equipment	10 feet of water, vertically	
Storm water disposal lines	Running water test	Water
Vacuum pump or condensate pump discharge and condensate return piping	150	Water
Domestic water piping	200	Water
Gas piping(steel threaded or plastic)	60 (both tests)	Air
Gas piping (steel welded)	100 (both tests)	Air

E. Equipment Performance Assurance Tests:

1. Before operating any equipment or systems, a thorough check shall be performed to determine that systems have been flushed and cleaned as required and that equipment has been installed, aligned, lubricated, and serviced. Factory instructions must be checked to verify installations have been completed and recommended lubricants have been installed in bearings, gearboxes, crankcases, and similar equipment. Care shall be furnished in lubricating bearings to avoid damage by over-lubrication and blowing out seals. Equipment shall also be checked for damage that may have occurred during shipment, after delivery, or during installation. Damaged equipment, products, and materials shall be replaced or repaired as required.
2. Upon completion of the above, adjust the system settings to within normal operating conditions to prevent the system from being damaged upon start-up.
3. Run test the equipment after start-up for five consecutive days. Tests shall include operation of all equipment and systems for a period of not less than two 8-hour periods at 90 percent of the full specified capacities.
4. Equipment Start-up Reports: For each equipment or system on which start-up is performed, submit 8 copies of start-up report for review by the Architect.
  - a. The start-up report shall include the manufacturer's standard start-up form completed and signed by the start-up technician.
5. Provide, maintain, and pay costs for equipment, instruments, and operating personnel as required for specified tests.

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COMMON WORK RESULTS FOR PLUMBING**

6. Provide electric energy and fuel required for tests.
  7. Final adjustment to equipment or systems shall meet specified performance requirements.
  8. Equipment, systems, or Work deemed defective during testing shall be replaced or corrected as required. Test until satisfactory results are provided.
- F. Specific Coordinated Plan for Test and Balance:
1. Provide a narrative of the operational intent that clearly describes the function and sequence of operation of each component, equipment, or system installed. Instruct designated Owner personnel in the operation of the installed systems.
  2. Prior to final test and balance, plumbing equipment and systems shall be operated and tested as indicated in Article 3.04.F above to demonstrate satisfactory overall operation of the installed systems.
  3. Welding performed as part of this Division may be subject to radiographic inspections at random in accordance with requirements specified in Section 22 0513: Basic Plumbing Materials and Methods.

**3.5 NOISE AND VIBRATION REDUCTION**

- A. Correct noise or vibration caused by plumbing systems. Provide all necessary adjustments to specified and installed equipment and accessories to reduce noise to the lowest possible level
- B. Correct noise or vibration problems caused by failure to install work in accordance with Contract Documents. Include all labor and materials required because of such failure. Pay for re-testing of corrected noise or vibration problems by the project acoustical consultant including travel, lodging, test equipment expenses, etc.

**3.6 PROTECTION, CARE AND CLEANING**

- A. In addition to storage criteria of the General Conditions, and provisions under Section 01 5000: Construction Facilities and Temporary Controls, the following shall be provided:
  1. Provide for the safety and good condition of materials and equipment until Substantial Completion. Protect materials and equipment from damage.
  2. Protect installed Work.
  3. Replacements: In case of damage, provide repairs and/or replacements immediately as required.
  4. Protect covering for bearings, open connections to tanks, pumps, compressors, and similar equipment.
  5. Interior piping shall be maintained free of dirt, grit, dust, and other foreign materials.
  6. Fixtures, piping, finished brass or bronze, and equipment shall have grease, adhesive, labels, and foreign materials removed. Chromium, nickel plate,

**SECTION 22 0500**  
**COMMON WORK RESULTS FOR PLUMBING**

polished bronze, or brass Work shall be polished. Glass shall be cleaned inside and out.

7. Before initial start-up and again before Substantial Completion, piping shall be drained and flushed to completely remove grease and foreign matter. Pressure regulating assemblies, traps, strainers, boilers, flush valves, and similar items shall be thoroughly cleaned. Tag system with an information tag listing responsible party and date of element before initial start-up and again before Substantial Completion. Compressed air, oil, and gas piping shall be blown out with oil-free compressed air or inert gas.

END OF SECTION

**SECTION 22 0513  
BASIC PLUMBING MATERIALS METHOD**

**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 9123 - Interior Painting: Field painting.

**1.2 WATERPROOFING**

**A.** Where work penetrates waterproofing, including waterproof concrete, Engineer will approve the method of installation & waterproofing 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.

**SECTION 22 0513  
BASIC PLUMBING MATERIALS METHOD**

- 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 will be repaired or replaced at no additional cost to the District. The method for repairing the damages or replacing; the Engineer must approve the damaged services.
- 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.

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**BASIC PLUMBING MATERIALS METHOD**

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 Engineer must approve the damaged services.

**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 onsite 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.
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

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BASIC PLUMBING MATERIALS METHOD**

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 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	14 (4.25)	7/8 (22)

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(200 to 300)		
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 can not be provided as a separation between dedicated electrical space 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 must 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.

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- 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 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 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 District.

**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.

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**BASIC PLUMBING MATERIALS METHOD**

**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.
- 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.

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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 1116  
DOMESTIC WATER PIPING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Below ground (outboard of building footprint) and above ground domestic water pipes, 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.

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DOMESTIC WATER PIPING**

**2.3 BALL VALVES**

- A. Manufacturers:
  - 1. Grinnell Corporation.
  - 2. Other acceptable manufacturers offering equivalent products.
    - a. Hammond Valve.
    - b. Milwaukee Valve Company.
    - 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.

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DOMESTIC WATER PIPING**

- 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.
- H. Provide water source up through roof to MAU-1 to include isolation valve.

**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.

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DOMESTIC WATER PIPING**

**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.
  - 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.

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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.

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- 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.
    - 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.

**SECTION 22 1319**  
**SANITARY WASTE PIPING SPECIALTIES**

**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.

**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.

**SECTION 22 1319  
SANITARY WASTE PIPING SPECIALTIES**

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Refer to Division 22 Section "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.
  - 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.

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**SANITARY WASTE PIPING SPECIALTIES**

- 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.

**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

**SECTION 22 4000  
PLUMBING FIXTURES AND EQUIPMENT**

**PART 1 - GENERAL**

**1.1 SUMMARY**

**A. Section Includes:**

1. Access Panel.
2. Drinking Fountain
3. Expansion Tank.
4. Floor Drain.
5. Floor Sink.
6. Hose Bibb.
7. Lavatory.
8. Sink Food Prep
9. Sink Hand Wash
10. Sink Mop.
11. Sink Three Compartment.
12. Trap Primer.
13. Urinal.
14. Water Closet.
15. Water Heater.

- 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 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.

**SECTION 22 4000  
PLUMBING FIXTURES AND EQUIPMENT**

- 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.

**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. Access Panel:
    - a. JL Industries TMS.
    - b. Or approved equal.
  - 2. Floor Drain:
    - a. J. R. Smith Fig. 2115-1.
    - b. Or approved equal.
  - 3. Floor Sink:
    - a. J. R. Smith.
    - b. Or approved equal.
  - 4. Hose Bibb:
    - a. Acorn 8121.
    - b. Or approved equal.
  - 5. Lavatory:
    - a. American Standard Lucerne Wall-Hung Lavatory; meter Chicago faucet 3501-8E2805ABCP.
    - b. Or approved equal.
  - 6. Sink Food Prep:
    - a. Regency 60S1181818XR; Elkay faucet LK940LGN08T6H.
    - b. Or approved equal.

**SECTION 22 4000  
PLUMBING FIXTURES AND EQUIPMENT**

7. Sink Handwash:
  - a. Regency 600HS172HDM; Chicago faucet MVP 802-665CP.
  - b. Or approved equal.
8. Trap Primer:
  - a. PPP Model P-2.
  - b. Or approved equal.
9. Urinal:
  - a. American Standard Washbrook Flowise 6590.503; Conceal Flushometer w/ push button.
  - b. Or approved equal.
10. Water closets:
  - a. American Standard Madera Flowise 16-1/2" Height Elongated Toilet; Conceal Flushometer w/ push button.
  - b. Or approved equal.
11. Water Heater:
  - a. Rheem E40A-12-G Electric.
  - b. Or approved equal.
12. Faucet for Mop Sink:
  - a. T&S Brass and Bronze Works, model B-0665-BSTP w/ approved vacuum breaker.
  - b. Or approved equal.

B. Furnish and install Products as indicated in Drawings.

**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.
  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 District.

**SECTION 22 4000  
PLUMBING FIXTURES AND EQUIPMENT**

**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. 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 7300 – Execution.

**SECTION 22 4000  
PLUMBING FIXTURES AND EQUIPMENT**

- 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 237433  
FILTERED SUPPLY FAN**

**PART 1 – GENERAL**

**1.1 SUMMARY**

- A. This section includes modular rooftop filtered make-up air fan(s), designed to deliver fresh outside makeup air for installations requiring frequent air changes. Units are designed for indoor or outdoor applications and are available in vertical or horizontal discharge configurations.

**1.2 SUBMITTALS**

- A. The manufacturer assumes no liability for the use or results of use of this document. This specification is to be reviewed by the engineer to confirm requirements of the project and building codes are met.
- B. As the manufacturer continues product development, it reserves the right to change design and specifications without notice.

**1.3 QUALITY ASSURANCE**

- A. ETL-Listed to listed and conforms to UL705 and CSA Std. C22.2.
- B. Miami-Dade Certification - NOA-2 Supply

**1.4 WARRANTY**

- A. All units are provided with the following 2-year standard warranty. Optional extended warranty available.
- B. This warranty shall not apply if:
  - 1. The equipment is not installed by a qualified installer per the manufacturer's installation instructions shipped with the product.
  - 2. The equipment is not installed in accordance with Federal, State, and Local codes and regulations.
  - 3. The equipment is misused, neglected, or not maintained per the manufacturer's maintenance instructions.
  - 4. The equipment is not operated within its published capacity.
  - 5. The invoice is not paid within the terms of the sales agreement.
- C. The manufacturer shall not be liable for incidental and consequential losses and damages potentially attributable to malfunctioning equipment. Should any part of the equipment prove to be defective in material or workmanship within the 2-year warranty period, upon examination by the manufacturer, such part will be

**SECTION 237433  
FILTERED SUPPLY FAN**

repaired or replaced by the manufacturer at no charge. The buyer shall pay all labor costs incurred in connection with such repair or replacement. Equipment shall not be returned without manufacturer's prior authorization, and all returned equipment shall be shipped by the buyer, freight prepaid to a destination determined by the manufacturer.

**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. Loren Cook.
  2. Greenheck.
  3. CaptiveAire
  4. Approved equal.

**2.2 GENERAL ASSEMBLY**

- A. Unit(s) shall be factory assembled, tested, and shipped as a complete packaged assembly, for indoor or outdoor mounting, consisting of the following specifications, deliver all capacities scheduled, and conform to design indicated herein. Alternate layouts or dimensional changes will not be accepted.

**2.3 CABINET**

- A. Unit(s) shall be constructed of minimum 20-gauge G-90 galvanized steel riveted together via structural pop-rivets. All metal shall be CNC bent for precise assembly.
1. Base Construction: The base shall be constructed of galvanized steel for improved rigidity. Base shall be structurally reinforced to accommodate the blower assembly.
  2. Rigging Provisions: The unit shall have a structural base constructed of minimum 14-gauge G-90 galvanized steel and include lifting points on all four sides.
  3. Roof Construction: Roof shall be pitched to allow for proper drainage.
  4. Exterior Wall Construction: All exterior walls shall consist of galvanized steel construction.
  5. Service Access Doors: All door jambs shall be gasketed around their perimeter. Doors may be mounted via spring actuated, stainless steel hinges with stainless steel rivets, and self-compressing stainless steel pad lockable latches or through removable sliding panels.
  6. Each compartment shall have removable access panels to allow for ease of service and maintainability. Electrical cabinet doors shall be outfitted with schematic and/or manual pouches formed into the door, along with wiring diagram attached to the interior of the door from the factory.

**SECTION 237433  
FILTERED SUPPLY FAN**

- B. Entire interior and exterior casing shall be constructed of minimum 20-gauge G-90 galvanized steel with no painting and shall have undergone a salt spray corrosion test as per ASTM B 117.

**2.4 SUPPLY AIR BLOWER AND MOTOR**

- A. All supply fans shall be belt driven.
- B. The blower assembly shall consist of a centrifugal backward inclined, non-overloading wheel secured directly to a heavy-duty, ball bearing type motor via two set screws. The motor and wheel assembly shall be mounted to a heavy gauge galvanized steel frame. The motor shall be controlled by a variable frequency drive, allowing for variable airflow without the need of belts and pulleys.
- C. Blower Motor: Motor shall be a premium efficiency motor available as:
  - 1. Open Drip Proof (ODP) motor driven by a Variable Frequency Drive.
- D. Fans to be selected at or near efficiency peak. Check fan curves provided with job.
- E. Blower and motor assembly shall be dynamically balanced. The entire blower and motor assembly shall be mounted on rubber vibration isolators. Wheels balanced as per AMCA 204-96; Balance Quality and Vibration Levels for fans.

**2.5 SHAFTS AND BEARINGS**

- A. Shafts shall be precision ground and polished. Heavy duty, pre-lubricated bearings designed for, and individually tested, specifically for use in air handling applications.

**2.6 AIRFLOW CONFIGURATIONS**

- A. Unit shall be configurable for down (vertical) discharge through unit.
- B. Unit intake airflow configuration shall be through use of a fresh/outdoor damper.
  - 1. Damper: Manufacturer shall provide and install on unit, when possible, a two-position, motor-operated damper with internal end switch to energize the blower-starter circuit. Blades shall be a maximum of 6" wide 16-gauge G-90 galvanized steel and shall be made to guarantee the absence of noticeable vibration at design air velocities. Damper blades are to be mounted on friction-free synthetic bearings. Damper edges shall have PVC coated polyester fabric mechanically locked into blade edge. Jamb seals used are flexible metal compression type. Damper shall exceed AMCA Class 1A standard for low leakage. Damper assembly shall be a single assembly and outfitted with an integral bird screen and louver/gutter system to divert any drainage through the base of the unit – intake air hood not required.

**SECTION 237433  
FILTERED SUPPLY FAN**

2. Actuator: A single direct drive damper actuator shall be used with spring return to ensure that the outdoor air section opens when not powered.

2.7 INTAKE

- A. Screened Intake Hood.

2.8 CURB (Selectable options)

- A. Full Perimeter Curb for pitched roof (or on shims).
- B. 16 Gauge
- C. MPU Clips

2.9 FILTERS

- A. Provide mesh filter and MERV-13 filtration as part of unit. All filters shall be furnished and installed to meet the performance requirements set forth in the schedule and as specified under another section of this work.
- B. Aluminum-mesh filters shall have aluminum frames with media to be layers of slit and expanded aluminum, varying in pattern to obtain maximum depth loading.
- C. The MERV-13 filters shall be (2") thick, pleated throw away. MERV-13 filters shall be installed on manufactured frames with clips for rated performance.

2.10 ELECTRICAL

- A. Installation shall be pre-wired and housed in an insulated electrical cabinet within the unit to protect against risk of condensation.
- B. All units shall be provided with single point electrical connection.
- C. Unit shall be provided with a door safety switch that de-energizes the supply fan when the door is opened.

2.11 OPTIONS

- A. Motorized Discharge Dampers.
- B. Motor Disconnect.
- C. Roof Curb.
- D. Duct Adapter.
- E. Cooling Thermostat.
- F. Extended Power Drop

**SECTION 237433  
FILTERED SUPPLY FAN**

2.12 INTAKE

- A. Provide intake at 3' below or 10' from grease exhaust termination.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine all areas and conditions under which packaged units are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION

- A. Install units in accordance with manufacturer's instructions, drawings, written specifications, manufacturer's installation manual, and all applicable building codes.

3.3 CONNECTIONS

- A. Provide installation of associated ductwork, plenums, diffusers, registers, et al. for complete installation.
- B. Electrical connections conform to applicable requirements in Division 26 Sections.

3.4 SYSTEM START-UP

- A. System start-up is performed by a factory-trained Service Technician.
- B. Provide worker-safe installation for equipment access, pitched roof, harnesses, eye bolts, et al.

END OF SECTION

**SECTION 26 0000  
ELECTRICAL**

**PART 1 - GENERAL**

**1.1 SCOPE OF WORK**

- A. The work covered by this section consists of furnishing and installing all I, materials, equipment, fixtures and performing all labor and operations for complete and operable systems.
- B. Provide all new materials, unless noted otherwise, of the best quality, and in perfect condition, and materials of the same make and quality throughout the work and as hereinafter specified. Comply with the requirements of ASTM, NEMA, U.L., and NBFM for materials and equipment.
- C. The intent of these specifications is to establish a standard of quality of materials installed. Include materials as specified without exception in the Base Bid. Submit for approval any proposed substitution, complete descriptive, technical, and cost comparison data and test reports. Do not furnish or install any substitute items without written approval at the time of contract signing. Reimburse the Owner for any additional engineering charges and for any changes in the work of other trades resulting from substitutions. List proposed substitutions on the Bid Form, stating the reasons for substitution. When requested by the Architect or Engineer of Record's, samples, electrically wired at 120V with plug, or system demonstrations of both specified and proposed items will be submitted for inspection at the Engineer's office and at a time convenient to all concerned parties.
- D. Where a substitution alters the design or space requirements indicated on the plans, Contractor is responsible for all additional cost for Engineering to revise plans.
- E. Verifying Drawings and Job Conditions:
  - 1. Examine all drawings and specifications in a manner to be fully familiar of all work required.
  - 2. Visit the site and verify existing conditions. Where existing conditions differ from drawings, make adjustments and allowances for all necessary equipment to complete all parts of the drawings and specifications.
- F. Shop Drawings:
  - 1. Submit drawings in one (1) set accompanied by letter of transmittal listing the number and dates of the drawings submitted.
  - 2. Mark the drawings submitted with the name of the project, numbered consecutively, and bearing approval as evidence that the drawings have been checked. Any drawings submitted without this approval will be returned for resubmission.

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3. Submit Shop drawings on, but not limited to, the following:
  - a. Panels
  - b. Lighting Fixtures
  - c. Transformer
  - d. Product List
  - e. Time switches
  
- G. Drawings of Record:
  1. Provide and keep up-to-date, a complete record set of blue line prints. Show every change from the original drawings. Keep this set of prints on the job site and use only as a record set. Do not make changes in the layout without definite instruction in each case. Obtain a set of Contract Drawings from Architect and incorporate all changes as noted on the record set of prints. Deliver this set to the Architect upon completion and acceptance of work.
  
- H. Accuracy of Plans and Specifications:
  1. Plans and/or specifications showing deviation from standard practice methods or from compliance with codes, and/or any omissions, does not relieve the responsibility of furnishing, making or installing all items required by code and/or intended for the function of the system.
  
- I. Permits, Fees, and Insurance:
  1. Obtain and pay for all insurance, permits, etc. necessary for this Contract.
  
- J. Codes and Regulations:
  1. All work performed under this Section of the Specifications complies with the rules and regulations of the Division of Industrial Safety, State of California, as set forth in the latest edition of the Electrical Safety Orders, the National Electrical Code, NFPA, and all rules and regulations of local codes having jurisdiction, including the presently adopted edition Title 21 and 24 California Administrative Code.
  
- K. Testing and Adjustment:
  1. Test all circuits, outlets, switches, lights, motors, circuit breakers and any other electrical equipment, upon completion of all electrical work.
  
- L. Guarantees of Materials and Workmanship:
  1. Furnish and install all materials under this Contract, new and free from all defects, and guaranteed for a period of two years from the date of acceptance of the work. Should any trouble develop during this period due to defective material or faulty workmanship, furnish all necessary labor and materials to correct the trouble without additional cost to the Contract. Correct any defective material or inferior workmanship noticed at the time of installation immediately, to the satisfaction of the Architect.
  
- M. Removal of Rubbish:

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ELECTRICAL**

1. Remove rubbish, excess materials, tools or equipment related to this portion of the work, frequently during construction and upon completion of the work.

N. Drawings and Specifications:

1. The electrical drawings are considered as part of these specifications, and any work or materials shown on the drawings and not mentioned in the specifications, or vice versa, shall be as if specifically mentioned in both.
2. The data herein specified and shown on the drawings is as exact as could be prepared, but their extreme accuracy is not guaranteed. The drawings and specifications are for assistance and guidance. The installation is essentially as shown and specified. The exact location of the equipment, material, apparatus and devices as well as the distances and levels, are more or less governed by the physical conditions and arrangements of the building. Accept this Contract with this understanding.
3. Make minor changes, when ordered by the Architect, accommodating the installation of the work with other sections of the Contract without additional cost to the Contract.

O. Safety Conditions:

It is the Contractor's responsibility to prevent any damages to personnel and/or property resulting from contact with new or existing energized circuits, switches, circuit breakers, or other electrical apparatus. All electrical work to be constructed with electrical systems de-energized in the area of work.

P. Final Inspection and Acceptance:

After all requirements of the specifications and drawings have been completed, a representative of the Owner will inspect the work. Provide competent personnel to demonstrate the operation of any item or system involved to the complete satisfaction of each representative.

**PART 2 - PRODUCTS**

**2.1 PANELBOARDS:**

- A. Provide the automatic circuit breaker type, quick-make, and quick-break panelboards. Provide wiring gutter sides, top, and bottom.
- B. Provide panelboards from the same manufacturers as the main switchboard; type, mounting, and size as noted on the drawings with silver-plated copper bussing.
- C. Where space is called for on the panelboard schedules, provide space and mounting for future circuit breaker installation as indicated.

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ELECTRICAL**

- D. Use trims having doors equipped with flush type combination lock and catch, two milled type keys supplied with each panel, all locks are keyed alike. Provide a clear covered directory frame with a typed identification card, indicating type of circuit and location, in accordance with final circuitry and panel designation on each door. Completely fill in all panel directories, using actual connections, Owner's designations, or other factual information. Key all doors to Yale LL803, or as directed by Owner.
- E. Where called for on the drawings, provide a separate compartment within the panelboards for contactors and/or time switches.

**2.2 CIRCUIT BREAKERS:**

- A. Provide circuit breakers with inverse time characteristic thermal and magnetic tripping elements, with an interrupting capacity of not less than 10,000 amperes, UL labeled, NEMA rated, molded case type. Use common trip single handle multi-pole breakers. Handle extensions are not permitted. All circuit breakers will have covers sealed on non-interchangeable trip breakers and trip unit covers sealed in interchangeable trip breakers to prevent tampering. Be sure the circuit breaker current rating markings clearly visible after breaker is installed. One manufacturer for all circuit breakers for a given panel. Provide bolt-on circuit breakers unless specifically noted on electrical drawings.

**2.3 TRANSFORMERS:**

- A. Provide copper transformers manufactured with the minimum following attributes:
  - 1. Dry type, with the ratings shown on the Drawings.
  - 2. Provide standard taps FCAN/FCBN.
  - 3. Adjust all taps to nominal 120V, 208V, or 480V, as close as practicable and as required for the voltage indicated.
- B. Provide insulation with temperature rise not exceeding 150 degrees C, under full load, in an ambient temperature of 40 degrees C.
- C. Provide transformers manufactured in accordance with current standards of IEE, ANSI, and NEMA, and provide UL listing and label.
- D. Install the transformer case on suitable vibration isolators and connect on primary and secondary sides with minimum of 18" of liquid tight flexible metallic conduit.
- E. Where drawings specify transformers suitable for non-sinusoidal current load of specified "K Factor", the transformer shall be U.L. listed specifically for that application.

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**2.4 POWER DISCONNECT SWITCHES:**

- A. Provide power disconnect switches having product construction requirements as specified and/or indicated. Where not otherwise indicated, the following requirements apply:
  - 1. Enclosure: NEMA I, surface type in dry locations. Use NEMA 3R for exterior locations.
  - 2. Ratings: Voltage, ampacity, horsepower and inductive ratings complying with power source voltage and characteristics of load controlled.
  - 3. Mechanism: Heavy-duty, quick-make, quick-break, with voidable interlock to prevent opening enclosure in "ON" position. External lockable handle operation with provision for not less than two padlocks.
  - 4. Poles and Fusing: Comply with load requirements. Provide unfused switches except where fusing is indicated or required to comply with Code Requirements. Where fuses are installed, use dual-element time delay fuses.
  
- B. Provide power disconnect switches of the following manufacturers with characteristics complying with load and power source indicated:
  - 1. Westinghouse: Type HF or HU.
  - 2. General Electric: Type TH.
  - 3. Square D: Type HD or HU.
  
- C. Provide the number of poles necessary to include a pole for each ungrounded conductor. Equip switch with neutral terminal point where neutral is present. Do not switch neutral unless indicated.

**2.5 PUSHBUTTON STATIONS AND CONTROL DEVICES:**

- A. The type and size of all pushbutton stations, switches, pilot lights and other control devices are as indicated on the drawings.

**2.6 RELAYS:**

- A. Install control relays for automatic controls or for interlocking as indicated in the drawings. Provide relays with the number and type of poles and with operating coils as indicated. Equip relays with contacts rated not less than 15 amperes for continuous inductive load, unless otherwise shown or specified. Rate operating coils for continuous duty at the operating voltage shown on the drawings.

**2.7 FUSES:**

- A. Provide (in a location designated by the Owner) a spare fuse cabinet with the following:
  - 1. Nameplate "spare fuses".

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2. Necessary fuse holders.
  3. Spare set of each size and type of fuses.
- B. Provide dual element fuses for all 600 volt or lower voltage requirements unless otherwise indicated or specified. Where fuses are not made for this application, furnish Buss "Limitron" or approved equal fuses.
- C. Provide Bussman Fuses as indicated on plans.
- D. Replace fuses "blown" or damaged during construction with new fuses of proper rating and type for the particular use, replace spare sets.

**2.8 LIGHTING FIXTURES:**

- A. Furnish, install, and connect lighting fixtures of type designed on the plans.
1. Verify all fixture locations with Architectural drawings prior to rough in.
  2. Where there is conflict in fixture quantities on any of the plans the greatest amount will prevail. The description of the lighting fixture supersedes the catalog number and is to be furnished and installed with type to fit description.

**2.9 CONDUIT AND FITTINGS:**

- A. Rigid Conduit (RGS): Hot dipped galvanized or sherardized steel. Republic Steel Co. or approved equal. Intermediate metal conduit may be used, where CEC allows, in lieu of RGS.
- B. Electrical metallic tubing (EMT): Welded, electro-galvanized thin wall steel tubing. All couplings are gland compression type.
- C. Non-metallic conduit (PVC): Polyvinyl chloride Schedule 40 or 80. Install a copper ground wire, sized per National Electrical Code, in all non-metallic conduit power raceways. Use PVC in underground installations only.
- D. Liquid tight Flexible Metal Electrical Conduit: Hot-dipped galvanized steel with exterior, molded polyvinyl jacket. Use for all final connections to all vibrating equipment, transformers, and the like. 18" maximum. Provide a code sized ground wire.
- E. Flexible metallic steel tubing: Liquid tight without a nonmetallic jacket. Use as allowed by code and were permitted by this Specification, section 3.06.C. Provide a code sized ground conductor.
- F. Condulet Type Fittings: As manufactured by Crouse Hinds Company, Appleton Electric Company, or Pyle National or approved equal, smooth inside and out, taper threaded with integral bushings.

**SECTION 26 0000  
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**2.10 CONDUCTORS:**

- A. Provide copper conductors, 600-volt A.C. unless noted otherwise. Aluminum conductors are not permitted.
- B. Use THWN conductors for underground and damp locations, THHN for dry areas.
- C. Deliver conductors to the site in unbroken packages, marked with the manufacturer's name, date of manufacture, voltage, and classification letters. Use only wire recently manufactured (10 months or less).
- D. Provide signal service and low voltage control conductors as specified or noted on the drawings.
- E. No conductor supplying 120 volts or more will be smaller than No. 12 AWG unless otherwise noted on the drawings.
- F. Fixture wire to comply with latest requirements of the National Board of Fire Underwriters. The carrying capacity of the wire as per the latest requirements of the National Electrical Code. No fixture wire may be smaller than #18 gauge. Protect wiring with tape or tubing at all points where abrasion is likely to occur.
- G. Install all conductors of each electrical system in an approved raceway. Factory assemblies, non-metallic/pliable/corrugated raceways, type UF cable or multi-conductor assemblies are not approved.
- H. Use solid conductor, size #10 AWG and smaller, stranded for #8 AWG and larger.

**2.11 JUNCTION AND PULL BOXES:**

- A. Above grade level, provide galvanized junction and pull boxes with removable covers, secured with machine screws. The sizes of all boxes determined by the number and size of conductors entering the box, and by the sizes of conduit terminating in the box. All boxes conform to the applicable Electrical Safety Orders, State of California. Pull boxes flush with grade shall be concrete, with bolt down concrete or steel covers, per plans, with engraved or beadweld identification.

**2.12 OUTLET BOXES:**

- A. Provide galvanized outlet boxes and covers, one piece pressed steel, knockout fixture outlets equipped with 3/8" fixture studs and plaster rings.

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- B. Where standard boxes are not suitable, provide boxes of special design to fit space.
- C. Cast aluminum or cast iron for outlet boxes exposed to weather, in damp locations, or surface mounted with threaded hubs for conduit connections; cover made watertight with gasket and non-ferrous screws.
- D. Provide outlet boxes in plaster covered walls with raised covers or plaster rings to finish flush with plaster.

**2.13 SWITCHES:**

- A. Local single pole switches: Flush tumbler type A.C. rated quiet type, heavy duty, back or side wired with binding screws, 20A, 120/277V rated switches, Bryant #4901, Hubbell or Leviton #1221, Sierra #5021, or Arrow Hart #1991. Two pole, three-way and lock type of the same manufacturer, white.
- B. Horsepower rated and approved for motor control service on switches controlling or disconnecting single-phase motor loads in excess of 1/3 h.p. Switches complete with overload devices of proper motor nameplate rating.
- C. Local single pole dimmer switches: Flush tumbler type with slide adjustment. 0-10 volt, back or side wired with binding screws, 20A, 120/277V rated.

**2.14 RECEPTACLES:**

- A. Convenience outlets consist of a duplex convenience receptacle mounted in an outlet box in the wall, flush with the finish surface and complete with plate.
- B. Receptacles for convenience outlets: Standard duplex, 3-wire grounding type 15 ampere, 125 volt, Hubbell, Bryant, Leviton, or Arrow Hart #5262 white, unless otherwise indicated.
- C. Weatherproof G.F.C.I. receptacles: 15 ampere, 2P 3-wire grounding type, 125 volt with gray fiberglass lift cover plate, Hubbell #GF5262, unless otherwise shown on plans.

**2.15 PLATES:**

Provide stainless steel plates for all switches, convenience outlets, telephone outlets and all other similar outlets, unless otherwise specified or noted.

**2.16 NAMEPLATES:**

- A. Nameplates shall be micarta or lamacoid plate, 1/8" thick and have approved size, with beveled edges and engraved white letters on black background.

## SECTION 26 0000 ELECTRICAL

Provide nameplates for all items of electrical equipment as well as circuits in the service distribution and power distribution panelboards; lighting distribution panelboards; separately mounted motor starting switches; disconnect switches; motor control pushbutton stations and other similar devices. Each nameplate as approved by the Architect. Use two machine screws for attachment. Cement/adhesive is not approved.

### PART 3 - EXECUTION

- 3.1 If construction of building reveals that any part of the Electrical Work would not be readily accessible if installed according to drawings, notify the Architect before proceeding with such installation.
- 3.2 All concrete work such as pull boxes, raised pads, conduit envelopes, and other areas where affecting Electrical Work are the responsibility of the Electrical Contractor.
- 3.3 Coordinate layout and installation of electrical work with the overall construction schedule and work schedules of various trades to prevent delay in completion of the project.
  - A. Verify dimensions and information regarding accurate location of equipment, structural limitations, and finish with other affected sections.
  - B. Job Conditions:
    1. The drawings do not always show offsets, bends, special fittings, or junctions or pull boxes necessary to meet job conditions. Provide the items as required at no cost to the Owner.
  - C. Weatherproof Equipment:
    1. Use weather resistant electrical devices or equipment located in damp, semi-exposed areas. Comply with NEMA Type 3R requirements for enclosures.
  - D. Where devices are shown diagrammatically in the same location, neatly group them together in a reasonable manner. Provide one-piece plate where such is manufactured.
- 3.4 Equipment requiring electrical under other sections is part of the Contract. Work includes all necessary connections.
- 3.5 EXCAVATION AND BACKFILLING:

Excavate and backfill in accordance with section in these documents covering that work.

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3.6 CONDUIT:

- A. Install all conduit concealed, except where specifically indicated as exposed. Use rigid galvanized steel or I.M.C. for all exposed conduit. Paint with two coats to match adjacent surroundings, if viewed by the public.
- B. Use galvanized rigid steel on all conduit installed in concrete and masonry walls, 3/4 inch trade size minimum, unless otherwise specified and/or noted on the plans. Verify conduit runs in concrete slab, prior to placement. Otherwise, do not run conduits in slabs.
- C. All conduit installed in the dry walls or dry ceilings of the building structures, shall be steel tube (EMT), except that in certain locations and for certain runs where it is impractical to install EMT, and where permission to do so has been given by the Architect, galvanized flexible steel conduit may be used, with a code sized ground conductor.
- D. Run conduit so as not to interfere with or make contact with other piping, fixtures, or equipment. Maintain 6" separation from water piping.
- E. Cut the ends of all conduit square and carefully ream out to full size, and shoulder in fitting.
- F. No running threads will be permitted in locations exposed to the weather, in concrete or underground. Use special watertight union fittings in these locations.
- G. Use PVC Schedule 40 or 80 for all underground conduits. Install all underground conduit at a depth of not less than 24 inches below the final finish grade, unless under concrete slabs or otherwise noted and/or specified. Provide metallic high voltage tape buried 12" above conduit, except under floor slab or under concrete walk, in which case, install 6" below bottom of slab. Use IMC for all horizontal and vertical sweeps or risers with factory applied PVC coating. Verify with serving utilities for service conduits, bends, depth below grade, backfill, etc. for specific types. Schedule 80 PVC sweeps are permitted for conduits 4" diameter and greater.
- H. Cut and patch all pavements, curbs, sidewalks, and gutters, whenever necessary for laying conduit, or whenever damaged by the operations of this trade. Replace materials with quality and finish equal to that removed or damaged.
- I. Where conduit extends through roof to equipment on roof areas, provide weatherproofing as specified in the appropriate section of these Specifications.
- J. Support all conduit in intervals not less than 10'-0" and within 36 inches from any outlet and at each side of bends and elbows. Use galvanized, concealed conduit supports, heavy stamped, one hole malleable conduit clamps secured with nails.

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On exposed conduit supports, use two hole clamps with screws, or galvanized steel framed channels secured by screws may be used for conduit supports. Perforated iron for supporting conduit is not permitted.

- K. Use rigid galvanized steel or I.M.C., threaded, for exposed conduit runs. Install parallel or perpendicular to walls, structural members or intersection of vertical plane and ceilings. Avoid field made bends and offsets where possible. Do not install crushed or deformed raceways.
- L. Provide metal sleeves and install where conduit passes through masonry or concrete walls. Use No. 20 gauge galvanized steel sleeves, no more than 1/2 inch greater in diameter than the outside diameter of the conduit. Caulk conduit into sleeves with stone wool, Duseal or Oakum and weatherproof below grade. Where conduit passes through fire resistive walls, partitions, and floors, pack void spaces between conduits with U.S.G. Thermafiber or equal, as approved by the State Fire Marshal.
- M. Provide a heavy nylon cord pull rope in all empty conduits for future use. Leave in place for future use in all runs and tagged with plastic tag at terminating end indicating the location of the opposite end of the conduit.
- N. Use factory-manufactured ells, except where noted otherwise. Field bends are permitted for EMT conduit less than 1" diameter. Conduit radius for signal system is ten times the internal diameter of the conduit.
- O. Cap or seal all conduit ends until wires are pulled.
- P. Use watertight gland compression type connectors and couplings on fittings for thin wall metallic conduit. Screw type or crimp type are not permitted.
- Q. Wire all rotating electrical equipment with flexible, liquid-tight conduit with appropriate slack from disconnect switch to equipment.
- R. Install expansion coupling at all expansion joint locations, refer to Architectural Drawings for locations.
- S. Use approved type-bending machines for PVC conduits. Use of blow torch is prohibited.
- T. For grouping, use conduit trapezes made up of suitable Unistrut or Kindorf hangers.
- U. Seal or cap all conduit for a watertight installation.
- V. Use approved conductor pulling machines for all underground conduits. Use of truck is prohibited.

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**3.7 OUTLET BOXES:**

- A. Attach outlet boxes on metal studs with TEC screws. Use wood screws for attachment on wood studs. Nails are not acceptable.
- B. Cover all boxes with outlet box protector, Appleton SB-CK or approved equal. Keep plaster and dirt from entering box or panels. If plaster does get in, removed it prior to pulling in wires.
- C. Close all unused openings with plugs.

**3.8 INSTALLATION OF CONDUCTORS:**

- A. Unless otherwise indicated or specified, do not install conductors of less than No. 12 AWG size. For control conductors protected by 15 ampere or lower overcurrent protection, No. 14 AWG conductors will be installed. Where approved by Code, remote control and signal circuits utilize No. 18 or No. 16 AWG sizes. Increase No. 12 to No. 10 AWG for 120 volt home runs exceeding 75 feet.
- B. Color code power wire and cable for feeders and branch circuits.
- C. Install all electrical conductors, including signal and communications circuits in an approved raceway.
- D. Neatly group conductors in panels, switchgear and terminal cabinets, etc., and form in a manner to fan into terminals with regular spacing. Lace formed groups of conductors with No. 12 waxed twine, or Panduit Co. Nylon Straps Numbers "SST-4-H" or "SST-2". Lace larger conductors with marlin and secure with cleats, or Panduit Co. Nylon Sta-Straps Numbers "SSC-4-H" and tie anchors ETA-1, TA-2, or TM-1-2-3.
- E. Install U.L. approved covered wire from all lighting fixture lamp sockets into outlet or junction box.

**3.9 WIRING COLOR CODE**

- A. 208Y/120 Volt System
  - Phase A - Black.
  - Phase A Switch Leg - Black with "S" tag.
  - Phase B - Red.
  - Phase B Switch Leg - Red with "S" tag.
  - Phase C - Blue.
  - Phase C - Switch Leg - Blue with "S" tag.
  - Travelers - Yellow.
  - Neutral - White.

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Equipment Ground - Green.

B. 480Y/277 Volt System

Phase A - Brown Phase A - Brown.

Phase A Switch Leg - Brown with "S" tag.

Phase B - Orange.

Phase B Switch Leg - Orange with "S" tag.

Phase C - Yellow.

Phase C Switch -Leg- Yellow with "S" tag.

Travelers - Yellow with "T" tag.

Neutral - Grey.

Equipment Ground - Green with Yellow stripe.

C. Provide identification tags on each conductor entering panel, switch, junction box and pull box to identify conductor.

3.10 UNDERGROUND PULL BOXES:

A. Set underground pull boxes at +3" above highest adjacent grade level.

B. No splices in Fire Alarm or Signal System conductors are permitted.

C. Size per NEC.

D. Provide nameplate on all covers.

1. "ELEC"

2. "LOW VOLTAGE"

3.11 CONDUCTOR JOINTS AND TAPING:

A. Make joints in conductors smaller than No. 6 AWG with solderless, tapeless, wing nut type pressure cable connector. Join conductors No. 6 AWG and larger together with approved type or pressure connector and tape to provide insulation not less than that of the conductor. Make connections to switch or bus bar with one-piece copper lugs for conductors No. 8 AWG or larger.

3.12 GROUNDING:

B. Provide grounding for entire electrical installation as required by the serving utility and codes mentioned in these specifications. Including:

1. Conduit.

2. Neutral or identified conductor of interior wiring system.

3. Power and lighting panel boards.

4. Non-current carrying metal parts or fixed equipment.

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5. Electrical panels in separate buildings.

END OF SECTION

**SECTION 26 0529  
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

**1.02 REFERENCE STANDARDS**

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2023.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2023.
- D. MFMA-4 - Metal Framing Standards Publication 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate sizes and arrangement of supports and bases with actual equipment and components to be installed.
  - 2. Coordinate work to provide additional framing and materials required for installation.
  - 3. Coordinate compatibility of support and attachment components with mounting surfaces at installed locations.
  - 4. Coordinate arrangement of supports with ductwork, piping, equipment and other potential conflicts.
  - 5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
  - 1. Do not install products on or provide attachment to concrete surfaces until concrete has cured; see Section 033000.

**1.04 SUBMITTALS**

**SECTION 26 0529**  
**HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel/strut framing systems, nonpenetrating rooftop supports, and post-installed concrete/masonry anchors.
- B. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
  - 1. Comply with the following. Where requirements differ, comply with most stringent.
    - a. NFPA 70.
    - b. Requirements of authorities having jurisdiction.
  - 2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of electrical work.
  - 3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
  - 4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
  - 5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
  - 6. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
    - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
    - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
    - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
    - d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps and clamps suitable for conduit or cable to be supported.

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**HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
  2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.
- D. Metal Channel/Strut Framing Systems:
1. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
  2. Comply with MFMA-4.
  3. Channel Material:
    - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
    - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
- E. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.
- F. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.
  2. New Concrete: Use preset concrete inserts.
  3. Existing Concrete: Use expansion anchors.
  4. Solid or Grout-Filled Masonry: Use expansion anchors.
  5. Hollow Masonry: Use toggle bolts.
  6. Hollow Stud Walls: Use toggle bolts.
  7. Steel: Use welded threaded studs complying with AWS D1.1/D1.1M with lock washers and nuts or Beam clamps (MSS Type 19 21 23 25 or 27) complying with MSS SP-69.
  8. Sheet Metal: Use sheet metal screws.
  9. Wood: Fasten with lag screws or through bolts.
  10. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.
  11. Plastic and lead anchors are not permitted.
  12. Preset Concrete Inserts: Continuous metal channel/strut and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
    - a. Manufacturer: Same as manufacturer of metal channel/strut framing system.

**SECTION 26 0529**  
**HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

- b. Comply with MFMA-4.
  - c. Channel Material: Use galvanized steel.
13. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

**3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install hangers and supports in accordance with NECA 1.
- C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- D. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- E. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- F. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- G. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- H. Equipment Support and Attachment:
  - 1. Use metal, fabricated supports or supports assembled from metal channel/strut to support equipment as required.
  - 2. Use metal channel/strut secured to studs to support equipment surface mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.

**SECTION 26 0529**  
**HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

3. Use metal channel/strut to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
  4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- 
- I. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
  - J. Secure fasteners in accordance with manufacturer's recommended torque settings.
  - K. Remove temporary supports.

**3.03 CONCRETE BASES**

- A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section "Cast-in-Place Concrete or Cast-in-Place Concrete (Limited Applications)" as applicable.
- C. Anchor equipment to concrete base.
  1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  2. Install anchor bolts to elevations required for proper attachment to supported equipment.
  3. Install anchor bolts according to anchor-bolt manufacturers written instructions.

**3.04 FIELD QUALITY CONTROL**

- A. Inspect support and attachment components for damage and defects.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

**SECTION 26 0533.13**  
**CONDUIT FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Galvanized steel rigid metal conduit (RMC).
- B. PVC-coated galvanized steel rigid metal conduit (RMC).
- C. Flexible metal conduit (FMC).
- D. Liquidtight flexible metal conduit (LFMC).
- E. Galvanized steel electrical metallic tubing (EMT).
- F. Reinforced thermosetting resin conduit (RTRC).

**1.02 REFERENCE STANDARDS**

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2020.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S) 2020.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT) 2020.
- E. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- F. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Metal Conduit and Intermediate Metal Conduit 2018.
- G. NEMA TC 14 (SERIES) - Reinforced Thermosetting Resin Conduit and Fittings Series 2015.
- H. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 1 - Flexible Metal Conduit Current Edition, Including All Revisions.
- J. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.

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**CONDUIT FOR ELECTRICAL SYSTEMS**

- K. UL 360 - Liquid-Tight Flexible Metal Conduit Current Edition, Including All Revisions.
- L. UL 514B - Conduit, Tubing, and Cable Fittings Current Edition, Including All Revisions.
- M. UL 797 - Electrical Metallic Tubing-Steel Current Edition, Including All Revisions.
- N. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations Current Edition, Including All Revisions.

**1.03 ADMINISTRATIVE REQUIREMENTS**

**A. Coordination:**

1. Coordinate minimum sizes of conduits with actual type and quantity of conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
2. Coordinate arrangement of conduits with structural members, ductwork, piping, equipment, and other potential conflicts.
3. Verify exact conduit termination locations required for boxes, enclosures, and equipment.
4. Coordinate work to provide roof penetrations that preserve integrity of roofing system and do not void roof warranty.
5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

**B. Sequencing:**

1. Do not begin installation of conductors and cables until installation of conduit between termination points is complete.

**1.04 SUBMITTALS**

- A. **Product Data:** Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.
- B. **Project Record Documents:** Record actual routing for conduits installed underground and conduits 2 inch (53 mm) trade size and larger.

**1.05 QUALITY ASSURANCE**

- A. **Product Listing Organization Qualifications:** Organization recognized by OSHA as Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

**PART 2 PRODUCTS**

**SECTION 26 0533.13**  
**CONDUIT FOR ELECTRICAL SYSTEMS**

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, manufacturer's instructions, and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
  - 1. Under Slab on Grade: Use rigid PVC conduit.
  - 2. Exterior, Direct-Buried: Use rigid PVC conduit.
  - 3. Where rigid polyvinyl chloride (PVC) conduit is provided, transition to galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), or schedule 80 rigid PVC conduit where emerging from underground.
  - 4. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use PVC-coated galvanized steel rigid metal conduit elbows for bends.
  - 5. Where galvanized steel rigid metal conduit (RMC) or galvanized steel intermediate metal conduit (IMC) is installed in direct contact with earth where soil has resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape, factory-applied corrosion protection coating, or field-applied corrosion protection compound acceptable to authorities having jurisdiction to provide supplementary corrosion protection.
  - 6. Where galvanized rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT) emerges from concrete into soil, use corrosion protection tape, factory-applied corrosion protection coating, or field-applied corrosion protection compound acceptable to authorities having jurisdiction to provide supplementary corrosion protection for minimum of 4 inches on either side of where conduit emerges.

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**CONDUIT FOR ELECTRICAL SYSTEMS**

- D. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).
- E. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT).
- F. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT).
- G. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.
- H. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).
- I. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit.
  - 1. Locations subject to physical damage include, but are not limited to:
    - a. Where exposed below 8 feet, except within electrical and communication rooms or closets.
- J. Exposed, Exterior: Use galvanized steel rigid metal conduit.
- K. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit.
- L. Corrosive Locations Above Ground: Use stainless steel rigid metal conduit (RMC), stainless steel intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit (RMC), stainless steel electrical metallic tubing (EMT), or reinforced thermosetting resin conduit (RTRC).
- M. Hazardous/Classified Locations: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), or PVC-coated galvanized steel rigid metal conduit (RMC).
- N. Flexible Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit (FMC).
  - 1. Maximum Length: 6 feet.
- O. Flexible Connections to Vibrating Equipment:
  - 1. Dry Locations: Use flexible metal conduit (FMC).
  - 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit (LFMC).
  - 3. Maximum Length: 6 feet unless otherwise indicated.

**SECTION 26 0533.13**  
**CONDUIT FOR ELECTRICAL SYSTEMS**

- 4. Vibrating equipment includes, but is not limited to:
  - a. Transformers.
  - b. Motors.
- P. Fished in Existing Walls, Where Necessary: Use flexible metal conduit (FMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).

**2.02 CONDUIT - GENERAL REQUIREMENTS**

- A. Comply with NFPA 70.
- B. Provide conduit, fittings, supports, and accessories required for complete raceway system.
- C. Provide products listed, classified, and labeled as suitable for purpose intended.
- D. Minimum Conduit Size, Unless Otherwise Indicated:
  - 1. Branch Circuits: 3/4 inch (21 mm) trade size.
  - 2. Branch Circuit Homeruns: 3/4-inch trade size.
  - 3. Control Circuits: 1/2-inch trade size.
  - 4. Flexible Connections to Luminaires: 3/8-inch trade size.
  - 5. Underground, Exterior: 1-inch trade size.
- E. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

**2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)**

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- B. Fittings:
  - 1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
  - 2. Material: Use steel or malleable iron.
  - 3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

**2.04 STAINLESS STEEL RIGID METAL CONDUIT (RMC)**

**SECTION 26 0533.13**  
**CONDUIT FOR ELECTRICAL SYSTEMS**

2.05 STAINLESS STEEL INTERMEDIATE METAL CONDUIT (IMC)

2.06 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.
- B. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil, 0.040 inch.
- C. PVC-Coated Boxes and Fittings:
  - 1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
  - 2. Nonhazardous Locations: Use boxes and fittings listed and labeled as complying with UL 514A, UL 514B, or UL 6.
  - 3. Hazardous/Classified Locations: Use fittings listed and labeled as complying with UL 1203 for classification of installed location.
  - 4. Material: Use steel or malleable iron.
  - 5. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil, 0.040 inch.
- D. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil, 0.015 inch.

2.07 FLEXIBLE METAL CONDUIT (FMC)

- A. Description: NFPA 70, Type FMC standard-wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems.
- B. Fittings:
  - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 2. Material: Use steel or malleable iron.

2.08 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

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**CONDUIT FOR ELECTRICAL SYSTEMS**

- B. Fittings:
  - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 2. Material: Use steel or malleable iron.
- 2.09 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)
  - A. Description: NFPA 70, Type EMT galvanized steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
  - B. Fittings:
    - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
    - 2. Material: Use steel or malleable iron.
    - 3. Connectors and Couplings: Use compression/gland.
      - a. Do not use indenter type connectors and couplings.
- 2.10 STAINLESS STEEL ELECTRICAL METALLIC TUBING (EMT)
- 2.11 REINFORCED THERMOSETTING RESIN CONDUIT (RTRC)
  - A. Description: NFPA 70, Type RTRC reinforced thermosetting resin conduit complying with NEMA TC 14 (SERIES).
  - B. Supports: As recommended by manufacturer.
  - C. Fittings: Same type and manufacturer as conduit to be connected.
- 2.12 ACCESSORIES
  - A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil, 0.020 inch.
  - B. Conduit Joint Compound: Corrosion-resistant, electrically conductive compound listed as complying with UL 2419; suitable for use with conduit to be installed.
  - C. Epoxy Adhesive for RTRC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
  - D. Pull Strings: Use nylon or polyester tape with average breaking strength of not less than 1,250 lbs.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.

**SECTION 26 0533.13**  
**CONDUIT FOR ELECTRICAL SYSTEMS**

- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

**3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install conduit in accordance with NECA 1.
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by manufacturer.
- E. Conduit Routing:
  - 1. Unless dimensioned, conduit routing indicated is diagrammatic.
  - 2. When conduit destination is indicated without specific routing, determine exact routing required.
  - 3. Conceal conduits unless specifically indicated to be exposed.
  - 4. Conduits installed underground or embedded in concrete may be routed in shortest possible manner unless otherwise indicated. Route other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
  - 5. Arrange conduit to maintain adequate headroom, clearances, and access.
  - 6. Arrange conduit to provide no more than equivalent of four 90-degree bends between pull points.
  - 7. Arrange conduit to provide no more than 150 feet between pull points.
  - 8. Route conduits above water and drain piping where possible.
  - 9. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
  - 10. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
  - 11. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
    - a. Heaters.
    - b. Hot water piping.
    - c. Flues.
  - 12. Group parallel conduits in same area on common rack.
- F. Conduit Support:

**SECTION 26 0533.13**  
**CONDUIT FOR ELECTRICAL SYSTEMS**

1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction; see Section 260529.
  2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
  3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
  4. Use conduit strap to support single surface-mounted conduit.
    - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
  5. Use metal channel/strut with accessory conduit clamps to support multiple parallel surface-mounted conduits.
  6. Use conduit clamp to support single conduit from beam clamp or threaded rod.
  7. Use trapeze hangers assembled from threaded rods and metal channel/strut with accessory conduit clamps to support multiple parallel suspended conduits.
  8. Use nonpenetrating rooftop supports to support conduits routed across rooftops, where approved.
  9. Use of spring steel conduit clips for support of conduits is not permitted.
  10. Use of wire for support of conduits is not permitted.
- G. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
  2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
  3. Use suitable adapters where required to transition from one type of conduit to another.
  4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
  5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
  6. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect conductors.

**SECTION 26 0533.13**  
**CONDUIT FOR ELECTRICAL SYSTEMS**

7. Secure joints and connections to provide mechanical strength and electrical continuity.
- H. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
  2. Make penetrations perpendicular to surfaces unless otherwise indicated.
  3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
  4. Conceal bends for conduit risers emerging above ground.
  5. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
  6. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.
  7. Install firestopping to preserve fire resistance rating of partitions and other elements; see Section 078400.
- I. Underground Installation:
1. Minimum Cover, Unless Otherwise Indicated or Required:
    - a. Underground, Exterior: 18 inches.
    - b. Under Slab on Grade: 12 inches to bottom of slab.
  2. Provide underground warning tape in accordance with Section 260553 along entire conduit length.
- J. Concrete Encasement: Where conduits not otherwise embedded within concrete are indicated to be concrete-encased, provide concrete in accordance with Section Concrete with minimum concrete cover of 3 inches on all sides unless otherwise indicated.
- K. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.

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**CONDUIT FOR ELECTRICAL SYSTEMS**

2. Where calculated in accordance with NFPA 70 for reinforced thermosetting resin conduit (RTRC) conduit installed above ground to compensate for thermal expansion and contraction.
  3. Where conduits are subject to earth movement by settlement or frost.
- L. Conduit Sealing:
1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:
  2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
    - a. Where conduits pass from outdoors into conditioned interior spaces.
    - b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- M. Provide pull string in each empty conduit and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.
- N. Provide grounding and bonding; see Section 260526.
- O. Identify conduits; see Section 260553.

**3.03 FIELD QUALITY CONTROL**

- A. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- B. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.
- C. Correct deficiencies and replace damaged or defective conduits.

**3.04 CLEANING**

- A. Clean interior of conduits to remove moisture and foreign matter.

**3.05 PROTECTION**

- A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

**SECTION 26 0533.16**  
**BOXES FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

**1.02 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- E. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports 2013 (Reaffirmed 2020).
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- I. UL 508A - Industrial Control Panels Current Edition, Including All Revisions.
- J. UL 514A - Metallic Outlet Boxes Current Edition, Including All Revisions.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.

**SECTION 26 0533.16**  
**BOXES FOR ELECTRICAL SYSTEMS**

2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

**1.04 SUBMITTALS**

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for floor boxes and underground boxes/enclosures.
- B. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  1. See Section 016000 - Product Requirements, for additional provisions.
  2. Keys for Lockable Enclosures: Two of each different key.

**1.05 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.

**PART 2 PRODUCTS**

**2.01 BOXES**

- A. General Requirements:
  1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
  2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
  3. Provide products listed, classified, and labeled as suitable for the purpose intended.
  4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

**SECTION 26 0533.16**  
**BOXES FOR ELECTRICAL SYSTEMS**

5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
  2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
  3. Use suitable concrete type boxes where flush-mounted in concrete.
  4. Use suitable masonry type boxes where flush-mounted in masonry walls.
  5. Use raised covers suitable for the type of wall construction and device configuration where required.
  6. Use shallow boxes where required by the type of wall construction.
  7. Do not use "through-wall" boxes designed for access from both sides of wall.
  8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
  9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
  10. Boxes for Supporting Luminaries: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
  11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
  12. Minimum Box Size, Unless Otherwise Indicated:
    - a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.
    - b. Communications Systems Outlets: 4 inch square by 2-1/8 inch (100 by 54 mm) trade size.
    - c. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep (100 by 38 mm) trade size.
  13. Wall Plates: Comply with Section 262726.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.

**SECTION 26 0533.16**  
**BOXES FOR ELECTRICAL SYSTEMS**

2. NEMA 250 Environment Type, Unless Otherwise Indicated:
3. Junction and Pull Boxes Larger Than 100 cubic inches:
  - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
  - a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
  - b. Back Panels: Painted steel, removable.
  - c. Terminal Blocks: Provide voltage/current ratings and terminal quantity suitable for purpose indicated, with 25 percent spare terminal capacity.

**PART 3 EXECUTION**

**4.01 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide separate boxes for emergency power and normal power systems.
- E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
- G. Box Locations:
  1. Locate boxes to be accessible. Provide access panels in accordance with Section Access Panels as required, where approved by the Architect.
  2. Unless dimensioned, box locations indicated are approximate.
  3. Locate boxes as required for devices installed under other sections or by others.
    - a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 262726.
  4. Locate boxes so that wall plates do not span different building finishes.

**SECTION 26 0533.16**  
**BOXES FOR ELECTRICAL SYSTEMS**

5. Locate boxes so that wall plates do not cross masonry joints.
  6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
  7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
  8. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
    - a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
    - b. Do not install flush-mounted boxes with area larger than 16 square inches or such that the total aggregate area of openings exceeds 100 square inches for any 100 square feet of wall area.
  9. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 260533.13.
  10. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
    - a. Concealed above accessible suspended ceilings.
    - b. Within joists in areas with no ceiling.
    - c. Electrical rooms.
    - d. Mechanical equipment rooms.
- H. Box Supports:
1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
  2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
- I. Install boxes plumb and level.
- J. Flush-Mounted Boxes:

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**BOXES FOR ELECTRICAL SYSTEMS**

1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
  2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
  3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- K. Install boxes as required to preserve insulation integrity.
- L. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- M. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- N. Close unused box openings.
- O. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- P. Provide grounding and bonding in accordance with Section 260526.

4.02 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

4.03 PROTECTION

- A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

**SECTION 26 0553**  
**IDENTIFICATION FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Voltage markers.
- E. Underground warning tape.
- F. Warning signs and labels.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

**1.03 REFERENCE STANDARDS**

- A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs 2011 (Reaffirmed 2017).
- B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels 2011 (Reaffirmed 2017).
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. NFPA 70E - Standard for Electrical Safety in the Workplace 2024.
- E. UL 969 - Marking and Labeling Systems Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
- B. Sequencing:
  - 1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.

**SECTION 26 0553**  
**IDENTIFICATION FOR ELECTRICAL SYSTEMS**

2. Do not install identification products until final surface finishes and painting are complete.

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- B. Shop Drawings: Provide schedule of items to be identified indicating proposed designations, materials, legends, and formats.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.07 FIELD CONDITIONS

- A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Identification for Equipment:
  1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
    - a. Switchboards:
      - 1) Identify ampere rating and name.
      - 2) Identify voltage and phase.
      - 3) Identify power source and circuit number. Include location when not within sight of equipment.
      - 4) Use identification nameplate to identify main overcurrent protective device.
      - 5) Use identification nameplate to identify load(s) served for each branch device. Identify spares and spaces.
    - b. Panelboards:
      - 1) Identify ampere rating and name.
      - 2) Identify voltage and phase.
      - 3) Identify power source and circuit number. Include location when not within sight of equipment.

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- 4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
      - 5) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Identify spares and spaces.
    - c. Transformers:
      - 1) Identify kVA rating and name.
  2. Service Equipment:
    - a. Use identification nameplate to identify each service disconnecting means.
  3. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
    - a. Service equipment.
    - b. Industrial control panels.
    - c. Motor control centers.
    - d. Elevator control panels.
    - e. Industrial machinery.
  4. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
    - a. Minimum Size: 3.5 by 5 inches.
    - b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.
- B. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 260519.
  2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at

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each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
    - a. At each source and load connection.
    - b. Within boxes when more than one circuit is present.
    - c. Within equipment enclosures when conductors and cables enter or leave the enclosure.
  4. Use wire and cable markers to identify connected grounding electrode system components for grounding electrode conductors.
- C. Identification for Raceways:
1. Use voltage markers to identify highest voltage present for accessible conduits at maximum intervals of 20 feet.
  2. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify circuits enclosed for accessible conduits at wall penetrations, at floor penetrations, at roof penetrations, and at equipment terminations when source is not within sight.
  3. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify spare conduits at each end. Identify purpose and termination location.
  4. Use underground warning tape to identify underground raceways.
- D. Identification for Boxes:
1. Use voltage markers to identify highest voltage present.
  2. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.
    - a. For exposed boxes in public areas, use only identification labels.
- E. Identification for Devices:
1. Wiring Device and Wallplate Finishes: Comply with Section 262726.
  2. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.
    - a. For receptacles in public areas or in areas as directed by Architect, provide identification on inside surface of wallplate.
  3. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.

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**IDENTIFICATION FOR ELECTRICAL SYSTEMS**

**2.02 IDENTIFICATION NAMEPLATES AND LABELS**

**A. Identification Nameplates:**

1. **Materials:**
  - a. **Indoor Clean, Dry Locations:** Use plastic nameplates.
  - b. **Outdoor Locations:** Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
2. **Plastic Nameplates:** Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
  - a. **Exception:** Provide minimum thickness of 1/8 inch when any dimension is greater than 4 inches.
3. **Stainless Steel Nameplates:** Minimum thickness of 1/32 inch; engraved or laser-etched text.
4. **Aluminum Nameplates:** Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
5. **Mounting Holes for Mechanical Fasteners:** Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

**B. Identification Labels:**

1. **Materials:** Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
2. **Text:** Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

**C. Format for Equipment Identification:**

1. **Minimum Size:** 1 inch by 2.5 inches.
2. **Legend:**
  - a. **Equipment designation or other approved description.**
3. **Text:** All capitalized unless otherwise indicated.
4. **Minimum Text Height:**
  - a. **Equipment Designation:** 1/2 inch.
  - b. **Other Information:** 1/4 inch.
5. **Color:**
  - a. **Normal Power System:** White text on black background.

**D. Format for Caution and Warning Messages:**

1. **Minimum Size:** 2 inches by 4 inches.
2. **Legend:** Include information or instructions indicated or as required for proper and safe operation and maintenance.

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3. Text: All capitalized unless otherwise indicated.
  4. Minimum Text Height: 1/2 inch.
  5. Color: Black text on yellow background unless otherwise indicated.
- E. Format for Receptacle Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
  2. Legend: Power source and circuit number or other designation indicated.
  3. Text: All capitalized unless otherwise indicated.
  4. Minimum Text Height: 3/16 inch.
  5. Color: Black text on clear background.
- F. Format for Control Device Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
  2. Legend: Load controlled or other designation indicated.
  3. Text: All capitalized unless otherwise indicated.
  4. Minimum Text Height: 3/16 inch.
  5. Color: Black text on clear background.

**2.03 WIRE AND CABLE MARKERS**

- A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
- B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- C. Legend: Power source and circuit number or other designation indicated.
- D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
- E. Minimum Text Height: 1/8 inch.
- F. Color: Black text on white background unless otherwise indicated.

**2.04 VOLTAGE MARKERS**

- A. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.
- B. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.

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- C. Minimum Size:
  - 1. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
  - 2. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches.
  - 3. Markers for Junction Boxes: 1/2 by 2 1/4 inches.
- D. Legend:
  - 1. Markers for Voltage Identification: Highest voltage present.
- E. Color: Black text on orange background unless otherwise indicated.

**2.05 UNDERGROUND WARNING TAPE**

- A. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
- B. Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil.
- C. Legend: Type of service, continuously repeated over full length of tape.
- D. Color:

**2.06 WARNING SIGNS AND LABELS**

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- B. Warning Signs:
  - 1. Materials: Anodized Aluminum Nameplates; minimum thickness of 1/32 inch; engraved or laser-etched text. Durable, corrosion resistant; in compliance with ANSI Z535.
  - 2. Minimum Size: 7 by 10 inches unless otherwise indicated.
- C. Warning Labels:
  - 1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
  - 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
  - 3. Minimum Size: 2 by 4 inches unless otherwise indicated.

**PART 3 EXECUTION**

**4.01 PREPARATION**

**SECTION 26 0553**  
**IDENTIFICATION FOR ELECTRICAL SYSTEMS**

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

**4.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
  - 1. Surface-Mounted Equipment: Enclosure front.
  - 2. Flush-Mounted Equipment: Inside of equipment door.
  - 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
  - 4. Elevated Equipment: Legible from the floor or working platform.
  - 5. Branch Devices: Adjacent to device.
  - 6. Interior Components: Legible from the point of access.
  - 7. Conduits: Legible from the floor.
  - 8. Boxes: Outside face of cover.
  - 9. Conductors and Cables: Legible from the point of access.
  - 10. Devices: Outside face of cover.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.
- G. Mark all handwritten text, where permitted, to be neat and legible.

**4.03 FIELD QUALITY CONTROL**

- A. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION

## **SECTION 26 2416 PANELBOARDS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Power distribution panelboards.
- B. Lighting and appliance panelboards.
- C. Overcurrent protective devices for panelboards.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

#### **1.03 REFERENCE STANDARDS**

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service 2013e, with Amendment (2017).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards 2015.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- E. NEMA PB 1 - Panelboards 2011.
- F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 1000 Volts or Less 2023.
- G. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- H. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- K. UL 67 - Panelboards Current Edition, Including All Revisions.

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**PANELBOARDS**

- L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures Current Edition, Including All Revisions.
- M. UL 943 - Ground-Fault Circuit-Interrupters Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
  - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
  - 3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
  - 4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
  - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

**1.05 SUBMITTALS**

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
- B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
- C. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.
- D. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

**SECTION 26 2416**  
**PANELBOARDS**

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Panelboard Keys: Two of each different key.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. ABB/GE: [www.electrification.us.abb.com/#sle](http://www.electrification.us.abb.com/#sle).

B. Eaton Corporation: [www.eaton.com](http://www.eaton.com).

C. Schneider Electric; Square D Products: [www.schneider-electric.us](http://www.schneider-electric.us).

D. Siemens Industry, Inc: [www.usa.siemens.com](http://www.usa.siemens.com).

**SECTION 26 2416**  
**PANELBOARDS**

- E. Source Limitations: Provide panelboards and associated components produced by same manufacturer as other electrical distribution equipment used for project and obtained from a single supplier.

**2.02 PANELBOARDS - GENERAL REQUIREMENTS**

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
  - 1. Altitude: Less than 6,600 feet.
  - 2. Ambient Temperature:
    - a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
- C. Short Circuit Current Rating:
  - 1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- F. Bussing: Sized in accordance with UL 67 temperature rise requirements.
  - 1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
  - 2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- G. Conductor Terminations: Suitable for use with the conductors to be installed.
- H. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
  - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
    - a. Indoor Clean, Dry Locations: Type 1.
    - b. Outdoor Locations: Type 3R.
  - 2. Boxes: Galvanized steel unless otherwise indicated.

**SECTION 26 2416**  
**PANELBOARDS**

- a. Provide wiring gutters sized to accommodate the conductors to be installed.
- 3. Fronts:
  - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
  - b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
- 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
- J. Load centers are not acceptable.

**2.03 POWER DISTRIBUTION PANELBOARDS**

- A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
  - 1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
  - 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
  - 1. Phase and Neutral Bus Material: Copper.
  - 2. Ground Bus Material: Copper.
- D. Circuit Breakers:
  - 1. Provide bolt-on type.
  - 2. Provide thermal magnetic circuit breakers for circuit breaker frame sizes less than 225 amperes.
  - 3. Provide electronic trip circuit breakers for circuit breaker frame sizes 225 amperes and above.
- E. Enclosures:
  - 1. Provide surface-mounted or flush-mounted enclosures as indicated.
  - 2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.

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3. Provide clear plastic circuit directory holder mounted on inside of door.

**2.04 LIGHTING AND APPLIANCE PANELBOARDS**

A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:

1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
2. Main and Neutral Lug Type: Mechanical.

C. Bussing:

1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
2. Phase and Neutral Bus Material: Copper.
3. Ground Bus Material: Copper.

D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.

E. Enclosures:

1. Provide surface-mounted or flush-mounted enclosures as indicated.
2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
3. Provide clear plastic circuit directory holder mounted on inside of door.

**2.05 OVERCURRENT PROTECTIVE DEVICES**

A. Molded Case Circuit Breakers:

1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
2. Interrupting Capacity:
  - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
    - 1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
    - 2) 14,000 rms symmetrical amperes at 480 VAC.

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PANELBOARDS**

- b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
3. Conductor Terminations:
  - a. Provide mechanical lugs unless otherwise indicated.
  - b. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
5. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.
6. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
7. Provide the following circuit breaker types where indicated:
  - a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
8. Do not use tandem circuit breakers.
9. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.
10. Provide the following features and accessories where indicated or where required to complete installation:
  - a. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.
  - b. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive panelboards.
- D. Verify that conditions are satisfactory for installation prior to starting work.

**SECTION 26 2416  
PANELBOARDS**

**3.02 INSTALLATION**

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 26 05 29.
- F. Install panelboards plumb.
- G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.
- H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.
- I. Provide minimum of six spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.
- J. Provide grounding and bonding in accordance with Section 260526.
- K. Install all field-installed branch devices, components, and accessories.
- L. Multi-Wire Branch Circuits: Group grounded and ungrounded conductors together in the panelboard as required by NFPA 70.
- M. Provide filler plates to cover unused spaces in panelboards.

**3.03 FIELD QUALITY CONTROL**

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than \_\_\_\_\_ amperes. Tests listed as optional are not required.
- C. Test GFCI circuit breakers to verify proper operation.
- D. Test shunt trips to verify proper operation.

**SECTION 26 2416  
PANELBOARDS**

- E. Correct deficiencies and replace damaged or defective panelboards or associated components.

**3.04 ADJUSTING**

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.

**3.05 CLEANING**

- A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

**END OF SECTION**

**SECTION 26 2816.16**  
**ENCLOSED SWITCHES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Enclosed safety switches.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- C. Section 26 28 13 - Fuses.

**1.03 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- C. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum) 2013.
- D. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- H. UL 98 - Enclosed and Dead-Front Switches Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated

**SECTION 26 2816.16**  
**ENCLOSED SWITCHES**

equipment spaces and within working clearances for electrical equipment required by NFPA 70.

2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

**1.05 SUBMITTALS**

- A. **Product Data:** Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.
- B. **Shop Drawings:** Indicate outline and support point dimensions, voltage and current ratings, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
  1. Include dimensioned plan and elevation views of enclosed switches and adjacent equipment with all required clearances indicated.
- C. **Project Record Documents:** Record actual locations of enclosed switches.

**1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. **Manufacturer Qualifications:** Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. ABB/GE: [www.geindustrial.com/#sle](http://www.geindustrial.com/#sle).
- B. Eaton Corporation: [www.eaton.com](http://www.eaton.com).
- C. Schneider Electric; Square D Products: [www.schneider-electric.us](http://www.schneider-electric.us).

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**ENCLOSED SWITCHES**

- D. Siemens Industry, Inc: [www.usa.siemens.com](http://www.usa.siemens.com).
- E. Source Limitations: Provide enclosed switches and associated components produced by same manufacturer as other electrical distribution equipment used for project and obtained from single supplier.

**2.02 ENCLOSED SAFETY SWITCHES**

- A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
  - 1. Altitude: Less than 6,600 feet.
  - 2. Ambient Temperature: Between -22 degrees F and 104 degrees F.
- D. Horsepower Rating: Suitable for connected load.
- E. Voltage Rating: Suitable for circuit voltage.
- F. Short Circuit Current Rating:
  - 1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
  - 2. Minimum Ratings:
    - a. Heavy Duty Single Throw Switches Protected by Class R, Class J, Class L, or Class T Fuses: 200,000 rms symmetrical amperes.
- G. Provide with switch blade contact position that is visible when the cover is open.
- H. Fuse Clips for Fusible Switches: As required to accept fuses indicated.
  - 1. Where NEMA Class R fuses are installed, provide rejection feature to prevent installation of fuses other than Class R.
- I. Conductor Terminations: Suitable for use with the conductors to be installed.
- J. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.

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**ENCLOSED SWITCHES**

- K. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
  - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
    - a. Indoor Clean, Dry Locations: Type 1.
    - b. Outdoor Locations: Type 3R.
- L. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.
- M. Heavy Duty Switches:
  - 1. Comply with NEMA KS 1.
  - 2. Conductor Terminations:
    - a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
  - 3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive enclosed safety switches.
- D. Verify that conditions are satisfactory for installation prior to starting work.

**3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 260529.
- E. Install enclosed switches plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.

**SECTION 26 2816.16  
ENCLOSED SWITCHES**

- G. Provide grounding and bonding in accordance with Section 260526.
- H. Provide fuses complying with Section 262813 for fusible switches as indicated or as required by equipment manufacturer's recommendations.

**3.03 FIELD QUALITY CONTROL**

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.
- C. Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

**3.04 ADJUSTING**

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

**3.05 CLEANING**

- A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

**END OF SECTION**

**SECTION 26 0500  
COMMON WORK RESULTS FOR ELECTRICAL**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies the basic requirements for electrical installations and includes requirements common to more than one section of Division 26. It expands and supplements the requirements specified in sections of Division 01.
- B. Related Requirements:
  - 1. Division 01 - General Requirements.
  - 2. Section 033000 - Cast-in-Place Concrete.
  - 3. Section 099100 - Painting and Coating.
- C. Applicable Standards
  - 1. ASTM D 709 (2007) – Laminated Thermosetting materials.
  - 2. ANSI/NEMA FB-1 (2010) – Standard for Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
  - 3. ANSI/NEMA 250 (2008) – Enclosure for Electrical Equipment (1000 Volts Maximum).
  - 4. California Electrical Code (CEC).
  - 5. IEEE C57.12.28 (2005) – Standard for Pad-Mounted equipment (Enclosure Integrity).
  - 6. UL 1 (2005) – Standard for Flexible Metal Conduit.
  - 7. UL 1242 (2007) – Standard for Electrical Intermediate Metal Conduit.
  - 8. UL 506 (2008) – Specialty Transformers.
  - 9. UL 6 (2010) – Electrical Rigid Metal Conduit-Steel.
  - 10. UL 797 (2007) – Electrical Metallic Tubing-Steel.
  - 11. UL 870 (2008) – Standard for Wireways, Auxiliary Gutters, and Associated Fittings

**1.2 BASIC ELECTRICAL REQUIREMENTS**

- A. Quality Assurance:
  - 1. Workers possessing the skills and experience obtained in performing work of similar scope and complexity shall perform the Work of this Division.
  - 2. Refer to other sections of the Specifications for other qualification requirements.
- B. Drawings and Specifications Coordination:
  - 1. For purposes of clearness and legibility, Drawings are essentially diagrammatic and the size and location of equipment is indicated to scale whenever possible. Verify conditions, dimensions, indicated equipment sizes, and manufacturer's data and information as necessary to install the Work of this Division. Coordinate location and layout with other Work.
  - 2. Verify final locations for rough-ins with field measurements and with the requirements of the equipment to be connected.
  - 3. Drawings indicate required size and points of termination of conduits, number and size of conductors, and diagrammatic routing of conduit. Install conduits with minimum number of bends to conform to structure, avoid

**SECTION 26 0500  
COMMON WORK RESULTS FOR ELECTRICAL**

- obstructions, preserve headroom, keep openings and passageways clear, and comply with applicable code requirements.
4. Routing of conduits may be changed provided that the length of any conduit run is not increased more than 10 percent of length indicated on the Drawings.
  5. Outlet locations shall be coordinated with architectural elements prior to start of construction. Locations indicated on the Drawings may be distorted for clarity.
  6. Coordinate electrical equipment and materials installation with building components and the Work of other trades
  7. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
  8. Coordinate connection of electrical systems with existing underground utilities and services.
- C. Terminology:
1. Signal Systems: Applies to clock, bell, fire alarm, annunciator, sound, public address, buzzer, telephone, television, inter-communication, elevator access controls, lighting control systems and security systems.
  2. Low Voltage: Applies to signal systems operating at 120 volts and less, and power systems operating at less than 600 volts. Medium voltage: Applies to power systems operating at more than 600 volts.
  3. UL: Underwriter's Laboratories Inc, Nationally Recognized Testing Laboratory (NRTL), or equal.
- D. Regulations: Work shall comply with the requirements of authorities having jurisdiction and the California Electrical and Building Codes. Material shall conform to regulations of the National Board of Fire Underwriters for electrical wiring and apparatus. Materials shall be new and listed by UL, or another NRTL.
- E. Structural Considerations for Conduit Routing:
1. Where conduits pass through or interfere with any structural member, or where notching, boring or cutting of the structure is necessary, or where special openings are required through walls, floors, footings, or other buildings elements, conform to CBC, Part 2, Title 24, Section 1906.3 for conduits and pipes embedded in concrete and Sections 2308.9.10 and 2308.9.11 for notches and bored holes in wood; for steel, as detailed on the structural steel Shop Drawings.
  2. Where a concrete encasement for underground conduit abuts a foundation wall or underground structure which the conduits enter, encasement shall rest on a haunch integral with wall or structure, or shall extend down to footing projection, if any, or shall be doweled into structure unless otherwise indicated. Underground structures shall include maintenance holes; pull boxes, vaults, and buildings.
  3. Holes required for conduit entrances into speaker poles, floodlight poles or other poles, shall be drilled with the conduit nipple or coupling welded to

**SECTION 26 0500  
COMMON WORK RESULTS FOR ELECTRICAL**

poles. Welds shall be provided by the electric arc process and shall be continuous around nipple or coupling.

- F. Electrically Operated Equipment and Appliances:
1. Furnished Equipment and Appliances:
    - a. Work shall include furnishing and installing wiring enclosures for, and the complete connection of electrically operated equipment and appliances and electrical control devices which are specified to be furnished and installed in this or other sections of the Specifications, wiring enclosures shall be concealed except where exposed Work is indicated on the Drawings.
    - b. Connections shall be provided as necessary to install equipment ready for use. Equipment shall be tested for proper operation and, if motorized, for proper rotation. If outlets are of incorrect electrical characteristics or any specified equipment fails to operate properly, repair and/or replace the outlet and/or equipment.
  2. Equipment and Appliances Furnished by Others:
    - a. Equipment and appliances indicated on Drawings as "not in contract" (NIC), "furnished by others," or "furnished by the Owner," will be delivered to the Project site. Required electrical connections shall be performed for such equipment and appliances. Motorized equipment will be furnished factory-wired to a control panel or junction box unless otherwise indicated. Appliances will be furnished equipped with portable cord and cap. Provide disconnect switches where required.
    - b. Connections to equipment furnished under this Division shall be part of the Work of this section. Work shall include internal wiring, installation, connection and adjustment of bolted drive motors in which the motor is supplied as a separate unit, and connections only for equipment furnished with factory installed internal wiring, except as further limited by Drawings and this Specification. Work shall include furnishing and installing suitable outlets, disconnecting devices, starters, push-button stations, selector switches, conduit, junction boxes, and wiring necessary for a complete electrical installation. Work shall also include furnishing and installing conduit and boxes for HVAC control systems, furnished under Division 23. Devices and equipment furnished shall be of same type used elsewhere on the Work or as specified.
    - c. Electrical equipment furnished under other sections, for installation and connection under Work of this section, will be delivered to the Project site ready for installation.
    - d. Mechanical equipment furnished under other sections, and requiring electrical connection under this section, will be set in place as part of the Work of the section furnishing such equipment unless noted otherwise.
    - e. Suitability and condition of equipment furnished under other sections shall be determined in advance of installation. Immediate notice of

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COMMON WORK RESULTS FOR ELECTRICAL**

damage, unsuitability, or lack of parts shall be given to the entity providing such equipment.

- G. Protection of Materials:
  - 1. Protect materials and equipment from damage and provide adequate and proper storage facilities during progress of the Work. Damaged materials and/or equipment shall be replaced.
  
- H. Cleaning:
  - 1. Exposed parts of Work shall be left in a neat, clean, usable condition. Finished painted surfaces shall be unblemished and metal surfaces shall be polished.
  - 2. Thoroughly clean parts of apparatus and equipment. Exposed parts to be painted shall be thoroughly cleaned of cement, plaster, and other materials. Remove grease and oil spots with solvent. Such surfaces shall be wiped and corners and cracks scraped out. Exposed rough metal shall be smooth, free of sharp edges, carefully steel brushed to remove rust and other spots, and left in proper condition to receive finish painting.
  - 3. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.
  
- I. WARRANTIES
  - 1. Provide one-year warranty on all material and labor performed, unless noted otherwise in specific sections.

**PART 2 - PRODUCTS - NOT USED**

**PART 3 - EXECUTION**

**3.1 GENERAL REQUIREMENTS**

- A. Advise the Inspector before starting the Work of this Division.
- B. Exposed conduits shall be painted to match the surfaces adjacent to installation.
- C. Salvaged materials removed from buildings shall be removed from the Project site as required by the Owner.
- D. Electrical equipment shall be braced and anchored for CBC Seismic Design requirements, or as otherwise indicated on the Drawings.

**3.2 DELIVERY STORAGE AND HANDLING**

- A. Deliver products to project site with proper identification, which shall include names, model numbers, types, grades, compliance labels, and similar information needed for District identification; all products and materials shall be adequately packaged and protected to prevent damage during shipment, storage, and handling.
- B. Coordinate deliveries of electrical materials and equipment to minimize construction site congestion.

**SECTION 26 0500  
COMMON WORK RESULTS FOR ELECTRICAL**

**3.3 CUTTING AND PATCHING**

- A. Cutting and patching of electrical equipment, components, and materials shall include the removal and legal disposal of selected materials, components, and equipment.
- B. Do not endanger or damage installed Work through procedures and processes of cutting and patching.
- C. Repair or restore other work, or surfaces damaged as a result of the work performed under this contract.

**3.4 CLEANUP**

- A. Remove rubbish, debris and waste materials and legally dispose off the Project site.
- B. Remove equipment and implements of service, and leave entire work area neat and clean, to the satisfaction of the Owner Authorized Representative.

**3.5 PROTECTION**

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

END OF SECTION

**SECTION 26 0513**  
**BASIC ELECTRICAL MATERIALS AND METHODS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Basic electrical methods.
  - 2. Grounding.
  - 3. Hangers and support.
  - 4. Electrical identification.
  - 5. Electrical system testing and inspection.
  
- B. Related Documents: The Contract Documents, as defined in Section 01 110 - 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 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 locations of fixtures are 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. Surface mounted raceways or conduit permitted only at locations directed by.
  
- D. Circuit grouping, conduit or cable runs and home runs with number of conductors required by code 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.
  
- E. 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.

**SECTION 26 0513**  
**BASIC ELECTRICAL MATERIALS AND METHODS**

- F. Seal and make permanent watertight penetrations by electrical raceways or equipment through ceilings, walls or floors.
  - 1. Seal penetrations in non-fire rated ceilings, walls or floors material specified in Section 079200 - Sealants.
- G. Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A, and NFPA 70.
- H. 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.
- I. 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 GROUNDING**

- A. Wire:
  - 1. Material: Stranded copper.
  - 2. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.

**2.2 HANGERS AND SUPPORTS**

- A. Product Requirements: Furnish and install approved materials, sizes, and types of anchors, fasteners, and supports to carry loads of equipment and conduit, including weight of wire in conduit plus 300 pounds.
- B. Materials and Finishes: Corrosion resistive.
- C. Anchors and Fasteners:
  - 1. Steel Structural Elements: Beam clamps and welded fasteners.
  - 2. Concrete Surfaces: Self-drilling anchors and expansion anchors.

**SECTION 26 0513**  
**BASIC ELECTRICAL MATERIALS AND METHODS**

3. Hollow Masonry, Plaster, and Gypsum Board Partitions: Toggle bolts and hollow wall fasteners.
4. Solid Masonry Walls: Expansion anchors.
5. Sheet Metal: Sheet metal screws.
6. Wood: Wood screws.

**2.3 ELECTRICAL IDENTIFICATION**

**A. Wire and Cable Markers:**

1. Description: Cloth tape or tubing type wire markers.
2. Locations: Each conductor at panel board gutters, pull boxes, outlet and junction boxes, and each load connection.
3. Legend:
  - a. Power and Lighting Circuits: Branch circuit or feeder number indicated on Drawings.

**PART 3 - EXECUTION**

**3.1 INSTALLATION - GROUNDING**

- A. Provide 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.

**3.2 INSTALLATION - HANGERS AND SUPPORTS**

- A. Install products in accordance with manufacturer's published instructions.
- B. Furnish and install anchors, fasteners, and supports in accordance with NECA SI.
- C. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.
- D. Do not use spring steel clips and clamps.
- E. Do not use powder-actuated anchors.
- F. Obtain permission from District Engineer before drilling or cutting structural members.

**SECTION 26 0513**  
**BASIC ELECTRICAL MATERIALS AND METHODS**

- 3.3 **INSTALLATION:** Installation of materials and equipment shall be in strict accordance with manufacturer's recommendations, instructions, industry standards, as indicated on the drawings and as specified herein. Provide all mounting facilities for securing or hanging fixtures, equipment and outlets to the satisfaction of the Engineer. Details shown on the plans are for the purpose of establishing the extent and general methods required. Provide all sleeves, inserts, expansion joints, vibration fitting, etc. Provide storage facilities and protect all work, materials and equipment from damage during process of work. Materials and equipment shall not be stored exposed to weather. Replace all damaged or defective work, materials and equipment without additional cost to the Owner.
- 3.4 **CONDUIT AND WIRING:** All conduit and wiring shall be installed concealed in walls, above ceilings and below floor slabs or exposed in accordance with applicable regulations and the Electrical Drawings. All penetrations of fire-rated walls or ceilings to be coordinated with Owner. Conduit runs are shown diagrammatically. Exact routing and location of the equipment to be determined in the field.
- 3.5 **MOISTURE PROTECTION:** Where required by regulations, all electrical devices in the spray radius of sprinklers shall be installed with weatherproof enclosures in compliance with these regulations.
- 3.6 **FIELD QUALITY CONTROL - ELECTRICAL TESTING AND INSPECTION**
- A. Section 014000 - Quality Control: Field testing and inspection.
- B. 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. Power Circuits: Conductors shorted to ground by a hot line grounded device approved for the purpose.
- C. Tests and inspections include, but are not limited to the following:
1. Proper operation of lights and equipment.
  2. Continuity of raceway system.
  3. Insulation leakage and impedances.
  4. Sub-system tests indicated in other Sections.

**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 permitted. Pulling of 2 AWG or larger conductors shall be performed with a cable pull machine. Any runs shorter

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**LOW-VOLTAGE WIRES (600 VOLT AC)**

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.
- M. 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, lighting control

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systems, LED drivers and wiring devices such as but not limited to GFI receptacles, 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.
  - 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: Color code conductor insulation as follows:

SYSTEM VOLTAGE		
Conductor	208Y/120	480Y/277
Phase A	Black	Brown

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Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Natural Gray

1. 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.

**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-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 2200**  
**LOW-VOLTAGE TRANSFORMERS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Provisions of Division 01 apply to this section
- B. Section Includes: This specification covers single-phase and three-phase general purpose individually mounted dry-type transformers, 600 V maximum, for power and lighting applications. It includes transformers as specified and as indicated on Drawings.
- C. All work, material or equipment shall comply with the codes, ordinances and regulations of the local government having jurisdiction, including the regulations of serving utilities and any participating government agencies having jurisdiction.
- D. Related Sections:
  - 1. Section 26 0500: Basic Electrical Materials and Methods.
  - 2. Section 26 0533: Raceways, Boxes, Fittings and Supports.
- E. Codes and Applicable standards: Products and installation shall meet or exceed the latest edition of the following standards.
  - 1. ANSI/IEEE C57.96, Distribution and Power Transformers, Guide for Loading Dry-Type Transformers; Appendix to ANSI C57.12 Standards.
  - 2. Department of Energy, Energy Act of 2005.
  - 3. International Electrical Code adopted by the State of California.
  - 4. ANSI/IEEE C89.2, Dry-Type Transformers for General applications.
  - 5. IEEE C57.12.91, Test Code for Dry-Type Distribution and Power Transformers.
  - 6. IEEE C57.110 – IEEE Recommended Practice for establishing capability when feeding nonsinusoidal load currents.
  - 7. NEMA standard 20, Dry-Type Transformers for General applications.
  - 8. UL 506, Specialty Transformers.
  - 9. UL 1561, Dry-Type General Purpose and Power Transformers.
  - 10. NEMA TP-1, 2002; Guide for Determining Energy Efficiency for Distribution Transformers.
  - 11. NEMA TP-2, Standard Test Method for Measuring the Energy Consumption of Distribution Transformers.
  - 12. NEMA TP-3, Standard for the Labeling of Distribution Transformer Efficiency.

No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. Any conflicts or changes required

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**LOW-VOLTAGE TRANSFORMERS**

to the contract documents in order to obtain compliance with applicable codes shall be brought to the immediate attention of the Owner Authorized Representative by the Contractor.

**F. ACRONYMS**

ANSI	American National Standards Institute
AOR	Architect of Record
CEC	California Electrical Code
EOR	Engineer of Record
IBC	International Building Code
IEEE	Institute of Electrical and Electronics Engineers
IOR	Inspector of Record
NEC	National Electrical Code
NEMA	National Electrical manufacturers Association

**1.2 DESIGN REQUIREMENTS**

- A. Transformers, Dry Type: Distribution transformers shall be wound with copper conductors. Performance of transformers shall meet or exceed the requirements of applicable codes and standards, the DOE Energy Policy Act of 2005 - Public Law 109-58 and the latest requirements of the California Energy Commission Appliance Efficiency Regulations.
- B. Transformers shall be self-cooled type with 220 degrees C. insulation and a maximum temperature rise of 150 degrees C. under continuous full load conditions with an ambient of 40 degrees C.
- C. Transformers shall be furnished with four 2.50 percent (2 above and 2 below normal voltage) taps. Windings shall be of fire-resistant type, designed for natural convection cooling through normal air circulation.
- D. Core mounting frames and enclosures shall be of welded and bolted construction with sufficient mechanical strength and rigidity to withstand shipping, installation, and short circuit stresses.
- E. Enclosure cover plates shall be sheet steel, captive bolted to enclosure framework. Enclosure shall provide suitable ventilating openings with rodent-proof screens, NEMA 1 enclosure. Enclosure shall be provided with lifting lugs and jacking plates as required. Transformers installed outdoors shall be provided with weatherproof NEMA 3R enclosure and weather proof kit.
- F. Transformers shall be furnished complete with mounting channels and mounting bolts. Metal parts, excepting cores and core mounting frames shall be furnished clean, rust-proofed, and provided with a coat of an inert primer.

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**LOW-VOLTAGE TRANSFORMERS**

- G. Transformers up to 35 KVA shall be no more than 40 decibels. Transformers 36 KVA or more shall be a minimum of 5 decibels below NEMA standards per unit. Transformers shall be provided with vibration dampers consisting of Korfund spring loaded shock mounts and Elastorib sheeting. Size and number of shock mounts shall be in accordance with manufacturer's recommendations.
- H. Transformers shall be UL listed.
- I. Each transformer to be installed under this section shall be sound tested at the factory. Contractor shall provide two copies of transformers tests reports for EOR's review.
- J. Equipment shown on drawings to scale is approximate only and based upon a general class of equipment specified. The Contractor shall verify all dimensions and clearances prior to commencement of work.
- K. The Contractor shall verify all points of connection with the manufacturer's requirements, instructions, or recommendations prior to installation. Actual dimensions, weights, clearances and installation requirements shall be verified and coordinated by the contractor.
- L. Provide transformers with a K rating as indicated on drawings. K-rated transformers shall be type NL-UL or NLP-UL as indicated on drawings and be equipped with the following features:
  - 1. Electrostatic shield.
  - 2. NLP series shall have a maximum sound level of 3 dB below NEMA standards.
  - 3. Double-size neutral terminal.
  - 4. Additional coil capacity to compensate for higher non-linear load loss.
  - 5. Heavy-gage ventilated indoor enclosures (provide weather shields where installed indoors).
  - 6. K-rated transformers shall meet all other requirements of this section.

**1.3 SUBMITTALS**

- A. Provide in accordance with Division 01.
- B. Shop Drawings: Include make, catalog number, dimensions, weight, KVA Rating, % Impedance, finish, type, insulation class, design temperature, sound levels, efficiency and taps provided. Include regulation at 80 percent and 100 percent of full load, no-load loss, full-load loss, percent efficiency, percent impedance, noise level and continuous capacity rating.
- C. Provide manufacturers data and inspection report that confirms transformers to be UL 1561 listed with K rating equal to that indicated on drawings.
- D. Provide a connection schematic diagram.

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**LOW-VOLTAGE TRANSFORMERS**

- E. Provide the following tests reports: IOR will review the reports for conformance with specified criteria, and compliance with the applicable standards. Submit one copy for each set of shop drawings being submitted.
1. Load Losses: Measurements shall be taken at multiple load levels and plotted to show compliance with specifications and correlated to efficiency curve for the transformer size and type.
  2. Provide No-Load and Total Losses report.
  3. Applied Voltage.
  4. Temperature Rise.
  5. Induced Voltage.
  6. Sound Level.
  7. Impulse Test.
  8. Manufacturer's nonlinear load test representing real world load mix.  
Transformers not meeting this requirement shall not be installed.

1.4 WARRANTY

- A. Transformers shall be warranted to be free from defects in materials and workmanship for a period of three years from the date of substantial completion.

PART 2 – PRODUCTS

2.1 EQUIPMENT

- A. Transformers shall be Square D, General Electric, PowerSmiths, MGM, Cutler Hammer or owner approved equal.

PART 3 - EXECUTION

3.1 DELIVERY AND STORAGE

- A. Deliver, storage, protect and handle products in accordance with the manufacturer's recommendations.

3.2 INSTALLATION

- A. Transformer core frame shall be installed level on shock absorbing pads within enclosure. Comply with CBC zone 4 seismic requirements.
- B. Mounting bolts on floor mounted transformers shall be extended into pads only and shall not be in direct contact with building structural members.
- C. Flexible jumpers shall be installed for grounding continuity from enclosure to conduits or bus ducts where required.
- D. Transformers installed outdoors or below grade shall be mounted on concrete pads as specified in Section 03 3000: Cast-In-Place Concrete.
- E. Install transformer ventilation openings not closer than 6 inches from wall surfaces.
- F. Do not install transformers in corrosive environments such as swimming pool pump and boiler rooms, or similar areas.

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**LOW-VOLTAGE TRANSFORMERS**

**3.3 VOLTAGE CHECK**

- A. Set taps on transformers to provide satisfactory operating voltages with present loads energized, including new loads and existing loads. A check shall be performed in the presence of the IOR at a panel fed from each transformer, which is farthest from transformer. Voltages at transformers ranging from 118 to 122 volts inclusive, for 120-volt systems and proportionately equivalent for higher voltage systems are permitted.
- B. Provide instruments and accessories required to perform checks. Voltmeters shall be accurate within .075 percent or one percent and shall have scales permitting voltage readings to be performed on upper half of scale. Calibration of the meters shall be observed by the IOR.
- C. Adjust transformer taps under full load operating conditions, to provide normal operating voltages at the loads.

**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 off Project site.
- B. Repair scratched or marred surfaces affected during the execution of work. Repair surfaces shall match original finish.

END OF SECTION

**SECTION 26 2726  
WIRING DEVICE DETAILS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Wall switches.
  - 2. Dimmers
  - 3. Receptacles.
  - 4. Device plates and box covers.
  
- 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. As specified in Section 260500 - Common Work Results for Electrical.

**1.2 REFERENCES**

- A. As specified in Section 260500 - 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 260500 - Common Work Results for Electrical.

**1.4 QUALITY ASSURANCE**

- A. As specified in Section 26 05 00 - 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.

**SECTION 26 2726**  
**WIRING DEVICE DETAILS**

**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.
  
- 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. PS20AC1I.
  - 3. Hubbell Cat. No. HBL1221.
  
- D. Color: White unless indicated otherwise.

**2.2 DIMMER 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.
  
- B. Provide 20 Amp, 120/277V, 0-10V DIMMING, specification grade, flush, slide adjustor with single pole toggle switch with side and back wired screw terminals. All dimmers shall be equipped with grounding screws.
  
- C. Dimmers:
  - 1. Leviton.
  - 2. P&S.
  - 3. Hubbell.
  
- D. Color: White unless indicated otherwise

**SECTION 26 2726  
WIRING DEVICE DETAILS**

**2.3 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.

**2.4 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: Stainless steel
  
- C. Weatherproof Cover Plate: Gasketed lockable cast metal with hinged gasketed device, listed as weather proof while in use.
  - 1. Red Dot cast aluminum.

**SECTION 26 2726  
WIRING DEVICE DETAILS**

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. As specified in Section 260500 - 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.

**SECTION 26 2726  
WIRING DEVICE DETAILS**

**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 260500 – Common Work Results for Electrical.
- B. Inspect each wiring device for defects.
- C. Operate each wall switch with circuit energized and verify proper operation.
- 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

**SECTION 26 5000  
LIGHTING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Interior and exterior luminaires and accessories.
  - 2. Drivers.
- 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 – Electrical.

**1.2 REFERENCES**

- A. As specified in Section 26 0500 - Electrical.

**1.3 SUBMITTALS**

- A. Division 1 - Submittal Procedures: Procedures for submittals.
- B. As specified in Section 26 0500 – 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 MOUNTING REQUIREMENTS**

- A. Design of lighting fixtures, accessories, supports, and method of fixture installation shall comply with requirements for earthquake-resistant construction of the State of California.

**SECTION 26 5000  
LIGHTING**

- B. Provide suspension points at no more than two feet from fixture ends. The space between supports shall not exceed eight feet.

1.5 QUALITY ASSURANCE

- A. As specified in Section 26 0500 - Electrical.

1.6 WARRANTY

- A. Provide a two-year labor warranty.
- B. Special Warranty for LEDs and Drivers: Manufacturers standard form in which manufacturer of LED's and drivers agrees to replace components that fail 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.

1.7 MAINTENANCE

- A. Division 1 - Closeout Procedures and Training: Procedures for closeout submittals.

PART 2 - PRODUCTS

2.1 LED LUMINAIRES

- A. General: Except as otherwise indicated, provide LED luminaires, of types and sizes indicated on fixture schedules. Furnish and install LED light fixture with permanently-fixed LED lamp module, complete with dedicated LED drivers and required mounting hardware. Prior to ordering fixtures, verify mounting methods and finishes.
- B. Luminaires to be provided under this scope include the following:
  - 1. Lithonia 54" Linear Ceiling Mounted LED Light VAP-4800LM-FST-MD-MVOLT-GZ-10-35K-80CRI
  - 2. Lithonia Wall-Mounted Vandal Resistant LED Wall Pack TWPX2-LED-AL0-40K-MVOLT-DDBXD
- C. 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 at 40°C ambient temperature.
  - 3. The rated operating temperature range shall be -30°C to +40°C.

## SECTION 26 5000 LIGHTING

4. Each luminaire can operate 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.
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 - Electrical.

#### 3.2 INSTALLATION

- A. 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.
- B. Install wall mounted luminaires and exit luminaire signs at height as scheduled.
- C. Install accessories furnished with each luminaire.
- D. Bond products and metal accessories to branch circuit equipment grounding conductor.

#### 3.3 FIELD QUALITY CONTROL

- A. As specified in Section 26 0500 - Electrical.
- B. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

#### 3.4 ADJUSTING

- A. Aim and adjust luminaires as directed by the Engineer

**SECTION 26 5000  
LIGHTING**

**3.5 CLEANING**

- A. Conform to Division 1 - Execution: Cleaning installed work.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosures.
- D. Clean photometric control surfaces as recommended by the manufacturer.
- E. Clean finishes and touch up damage.

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

## SECTION 32 1313 CONCRETE PAVING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Concrete Pavement
  - 2. Concrete curbs.
  
- B. Related Documents: The Contract Documents, as defined in Section 01 0100 - 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 Concrete Institute (ACI):
  - 1. ACI 301 - Specifications for Structural Concrete.
  - 2. ACI 308 - Standard Practice for Curing Concrete.
  
- B. American society for Testing and Materials (ASTM):
  - 1. ASTM A 185 - Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.
  - 2. ASTM A 615 - Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
  - 3. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.
  - 4. ASTM C 618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
  - 5. ASTM D 1751 - Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
  
- C. California Building Code.
  - 1. Finish Surface shall maintain a minimum coefficient of friction of at least 0.6 per CBC 1124B.1/ADA Standard 4.5.1

#### 1.3 SUBMITTALS

- A. Procedures for submittals:
  - 1. Product Data: Submit product data for the following:
    - a. Joint filler.
    - b. Joint sealant.
    - c. Concrete admixtures.
    - d. Concrete curing compounds.
  
  - 2. Assurance/Control Submittals:

## SECTION 32 1313 CONCRETE PAVING

- a. Concrete Mix Design: Submit three copies of each proposed mix design for each class of concrete in accordance with ACI 301, Sections 3.9 "Proportioning on the basis of previous field experience or trial mixture", or 3.10 "Proportioning based on empirical data". Submit separate mix design for concrete to be placed by pumping, in addition to the mix design for concrete to be placed directly from the truck chute.
- b. Include the following information in concrete mix design:
  - 1) Proportions of cement, fine and coarse aggregate, and water.
  - 2) Water-cement ratio, 28-day compressive design strength, slump, and air content.
  - 3) Type of cement and aggregate.
  - 4) Aggregate gradation.
  - 5) Type and dosage of admixtures.
  - 6) Special requirements for pumping.
  - 7) Range of ambient temperature and humidity for which design is valid.
  - 8) Special characteristics of mix that require precautions in mixing, placing, or finishing techniques to achieve finished product specified.

### 1.4 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301.
- B. Conform to ACI 305R when mixing and placing concrete during hot weather.
- C. Conform to ACI 306R when mixing and placing concrete during cold weather.
- D. Regulatory Requirements:
  1. Conform to applicable requirements for paving work on public property.
  2. Contractor must maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize temporary striping, flagmen, barricades, warning signs, and warning lights as required.

## PART 2 - PRODUCTS

### 2.1 FORM AND REINFORCING MATERIAL

- A. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use flexible spring steel forms or laminated boards to form radius bends as required.
  1. APA Exterior Plyform BB or approved equal with a medium density, smooth, hard, fused resin fiber overlay, or metal forms.
  2. Form Oil: Coat forms with nonstaining type coating that will not discolor or deface surface of concrete. Subject to compliance with requirements, manufacturers

## SECTION 32 1313 CONCRETE PAVING

offering specified items which may be incorporated in the work include the following.

- a. "Eucoslip" - Euclid Chemical Co.,
- b. "Form Coating" - Nox-Crete Chemicals,
- c. Or approved equal as permitted in Section 01 6000 - Product Requirements.

B. Curb Forms: Use flexible spring-steel forms or laminated boards to form radius bends. Tolerance: Not to deviate more than 1/4 inch in 10 feet in grade and alignment.

C. Reinforcing:

1. Reinforcing Bars: Deformed steel bars, ASTM A 615, Grade 60.

D. Reinforcing Accessories:

1. Reinforcing Accessories: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
  - a. Dayton Superior Corp.,
  - b. Heckmann Building Products, Inc.,
  - c. Hohmann & Barnard, Inc.,
  - d. Richmond Screw Anchor Co., Inc.,
  - e. Or approved equal as permitted in Section 01 6000 – Product Requirements.
2. Conform to Concrete Reinforcing Steel Institute Manual of Standard Practice. Include spacers and chairs with plastic tipped legs, ties, and other devices necessary for properly assembling, placing, spacing, and supporting forms and reinforcement in place.

### 2.2 CONCRETE MATERIALS

A. Cement:

1. Portland Cement: ASTM C150 Type 1.
2. High-early Strength Portland Cement: ASTM C150, Type III.

B. Aggregates: ASTM C33.

1. Fine aggregate shall be natural sand, or sand prepared from stone or gravel. Grains shall be clean, hard, durable, uncoated, and free from silt, loam, and clay.
2. Coarse Aggregates: Crushed stone, gravel, or other approved inert materials of similar characteristics, or combinations thereof, having hard, strong, durable pieces free from adherent coatings. Maximum size of pieces shall be 3/4" to #4 except for footings, which may be 1-1/2". The maximum size of aggregate may also be not larger than one fifth of the narrowest dimension between forms, nor larger than three fourths of the minimum clear spacing between reinforcing bars.

C. Water: Clean and free from injurious amounts of oil, acids, salts, organic or other deleterious matter.

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- D. Air Entrainment: ASTM C260.
1. Use air-entrained concrete for exterior exposed concrete including walls, walks, paving, etc. where minimum daily temperatures are expected below 38 degrees F during pouring or subsequent 38-day curing period.
  2. Proportion air-entraining concrete to attain minimum 28-day compressive strength specified.
  3. Total Air Entrainment in Concrete: Not less than four percent nor more than six percent volume of concrete.
- E. Admixtures:
1. May be used at contractor's option to provide workability at low slumps, increased compressive strength, retardation, or acceleration of the concrete.
  2. Chemical Admixtures: ASTM C494. Mineral Admixtures: ASTM C618.
  3. The cement factor shall not be reduced, and changes shall be made in the other mixed proportions to ensure the minimum strength requirements.
  4. Use of admixtures approved in writing by Architect. No additional expense to the Owner will be allowed.
  5. No calcium chloride shall be used.
  6. Before any admixture is accepted for use, the Contractor shall submit certified laboratory reports on each additive material to the Engineer. The report shall show the following:
    - a. Confirmation of compliance with the applicable ASTM Standard.
    - b. Evaluation of the effects of the admixture on the properties of the concrete to be made on the job, including consideration of the anticipated ambient conditions on the job, and proposed construction procedures.
    - c. Determination of within-lot uniformity of product proposed for use.

**2.3 CONCRETE MIXES**

- A. Concrete Proportions:
1. Concrete shall be homogenous, and when hardened, shall have the required strength, resistance to deterioration, durability, water tightness, and the properties as specified.
  2. Minimum concrete strength at 28 days shall be.
    - a. 3,000 psi for walks.
    - b. 3,000 psi for concrete pavement and pads, no Deputy Inspector required.
  3. Slump of concrete:
    - a. Pavement: 2-1/2-inch minimum to 4 inch maximum.
- B. Ready-Mix Concrete:
1. Ready-mix concrete shall conform to ASTM C94. The mixing agitation shall begin within 30 minutes, and the concrete shall be discharged from the truck within one hour after the water has been added to the concrete mix.
  2. Delivery tickets are to accompany each concrete truck and shall be kept in the job superintendent's file. Delivery tickets must indicate the following information or be subject to rejection:

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CONCRETE PAVING**

- a. Name of project.
  - b. Supplier of concrete.
  - c. Truck identity and ticket serial number.
  - d. Date of delivery.
  - e. Brand of cement.
  - f. Cement content.
  - g. Strength classification.
  - h. Batching time.
  - i. Point of deposit.
  - j. Total amount of water.
  - k. Weight of aggregate.
  - l. Daily temperature.
  - m. Number of cubic yards in load.
  - n. Admixture content.
  - o. Name of Contractor.
  - p. Name of driver.
  - q. Time loaded and first mixing of concrete.
  - r. Reading of revolution counter.
3. Quantity of water used for each batch shall be accurately measured.

**2.4 JOINT MATERIALS**

- A. Sealed expansion and contraction joints: Filler of nonbituminous rubber or cork conforming to ASTM D1752.
- B. Non-sealed joints:
1. Non-sealed Joints: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
    - a. "Flexcell" - Celotex Corp.
    - b. "Seal Tight Fiber Expansion Joint" - W.R. Meadows, Inc.
    - c. Or approved equal as permitted in Section 01 6000 – Product Requirements.
  2. Filler premolded bituminous type conforming to ASTM D1751.
- C. Noncompressive Filler:
1. Noncompressive Filler: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
    - a. "Styrofoam SM" - Dow Chemical Co.
    - b. "Foamular" - Owens Corning.
    - c. Or approved equal as permitted in Section 01 6000 – Product Requirements.
  2. 2 inch or 1-inch-thick sheets.
- D. Compressive Filler:

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CONCRETE PAVING**

1. Compressive Filler: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
  - a. "Ethafoam" - Dow Chemical Co.
  - b. "Rodofoam No. 423" - Sternson Group.
  - c. Or approved equal as permitted in Section 01 6000 – Product Requirements.
2. 2 inch or 1-inch-thick sheets, compression modulus within the range of 15 to 25 pounds per square inch per inch.

E. Filler Adhesive for Noncompressive Filler and Compressive Filler:

1. Filler Adhesive: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
  - a. "General Purpose Mastic No. 11" - Dow Chemical Co.
  - b. "Rodofast" - Sternson Group.
  - c. Or approved equal as provided in Section 01 6000 - Product Requirements.

F. Slab-on-grade Construction Joints: Provide a full slab depth 24-gauge metal pre-shaped key, approximate depth of key to be 1/4 slab thickness and a key width of about 1/10 slab thickness.

G. Joint Sealants: ASTM C920. Non-priming, pourable, self-leveling polyurethane. Subject to compliance with project requirements manufacturers offering joint sealants which may be incorporated in the Work include, but are not limited to the following:

1. Sonolastic Paving Joint Sealant, by Sonneborn.
2. Sonomeric CT 1 Sealant, by Sonneborn.
3. Sonomeric CT 2 Sealant, by Sonneborn.
4. Vulkem 45, by Mameco.
5. Chem-Caulk, by Bostik.
6. "THC-900" – Tremco.
7. Or approved equal as provided in Section 01 6000 - Product Requirements.

## 2.5 CURING MATERIALS

A. Sealers:

1. Sealers: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
  - a. "Polyseal" - W.R. Meadows, Inc.
  - b. "Kure-N-Seal" – Sonneborn.
  - c. "Cure-Hard" - W.R. Meadows, Inc.
  - d. Or approved equal as provided in Section 01 6000 - Product Requirements.
2. ASTM C156 and ASTM C309, Type I. Material shall become integral part of concrete and leave slab free of residue or film.

B. Membrane: Opaque-white polyethylene sheet, 0.006-inch-thick, meeting requirements of ASTM C171.

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**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates, and conditions are as required, and ready for earthwork operations to begin.
  - 1. Verify gradients and elevations of base are correct, and base is dry.
- B. Report in writing to the District any 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.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the District.

**3.2 SUBGRADE PREPARATION**

- A. Thoroughly wet subgrade and then compact with two passes of a 500-pound roller.
- B. Pumping: Where concrete paving or sidewalks and curbs are to be placed, yielding material deflecting more than 1/2 inch under a 500 lb. roller shall be removed to a depth of not less than 4 inches below subgrade elevation and replaced with approved granular material which shall then be compacted as described above.
- C. The subgrade must be in a moist condition when the concrete is placed. In cold weather, the subgrade shall be prepared and protected to provide a subgrade free from frost when the concrete is deposited.

**3.3 FORM CONSTRUCTION**

- A. Check complete formwork for grade and alignment to the following tolerances:
  - 1. Top of form: Not more than 1/8 inch in 10 feet.
  - 2. Vertical face: Longitudinal axis not more than 1/4 inch in 10 feet.

**3.4 PLACING REINFORCEMENT**

- A. Support reinforcing and wire securely together to prevent displacement by construction loads and traffic, or the placing of concrete. For slabs on grade, supporting pieces of concrete blocks or bricks may be used.
- B. Reinforcement shall be kept clean from oil, dirt and loose mill scale or other coatings which might destroy the concrete bond. Remove tags and markings prior to concrete placement.

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- C. Do not place concrete until reinforcement has been inspected and approved by the City Inspector and District Engineer.

**3.5 CONCRETE PLACEMENT AND FINISHING**

- A. Tamp and consolidate concrete with a suitable wood or metal tamping bar and the surface shall be finished to grade with a wood float.
- B. Finished surfaces shall not vary more than 3/16 inch from the testing edge of a 10-foot straightedge.
- C. Curb Expansion Joints: Fill joints with 1/2-inch-thick joint filler strips conforming to ASTM D1751 or ASTM D1752.
- D. Contraction Joints: Divide the surface of paving, walks and terraces into rectangular areas not to exceed 5 feet 0 inches each way.
  - 1. Cut a groove in the top portion of the slab to a depth of at least one-fourth of the slab thickness using a jointer or by sawing a groove in the hardened concrete with a power-driven saw.
  - 2. Membrane-cured surface damaged during the sawing operations shall be resprayed as soon as the surface becomes dry.
- E. Slab Finishes: ACI 301, paragraph 11.7 and as follows:
  - 1. Broom Finish: On walks, unless other finishes have been indicated or specified.
  - 2. Broom or Belt Finish: On level walks. Broom in direction perpendicular to travel and approved sample panel. Submit joint pattern layout prior to starting work.

**3.6 TOLERANCES**

- A. Horizontal slabs: Finished surfaces true with no deviation more than 1/8 inch when tested with a 10-foot straightedge, non-accumulative. No coarse aggregate showing.

**3.7 EXPANSION JOINTS**

- A. Install transverse expansion joints at returns and 15 feet maximum on center. See Drawings.
- B. Install longitudinal expansion joints where curbs and paved areas abut each other, buildings, other concrete slabs and pads or vertical restraints.
- C. Place joint filler with top edge 1/4 inch below the surface and shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing.

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CONCRETE PAVING**

- D. Immediately after finishing operations are completed, round joint edges with edging tool having a radius of 1/8 inch. Remove concrete over the joint filler.
- E. At the end of the curing period, clean and fill expansion joints with joint sealer. Fill joints flush with concrete surface. Dummy groove joints shall not be sealed.

**3.8 CURING**

- A. Immediately after the finishing operations, the exposed concrete surface shall be cured for 7 days by the mat, impervious sheet, or membrane-curing method.

**3.9 BACKFILLING**

- A. After curing, remove debris and backfill the adjoining areas, grade and compact to conform to the surrounding area in accordance with the lines and grades indicated.

**3.10 PROTECTION**

- A. Protect the completed work from damage. Repair damaged concrete and clean concrete discolored during construction. Remove work that is damaged and reconstruct to entire length between regularly scheduled joints. Refinishing damaged portions is not acceptable.
- B. Prevent vehicles and heavy equipment from driving on new pavement for a minimum of 14 days.

END OF SECTION

**SECTION 32 1726**  
**DETECTABLE WARNING SURFACE PANELS SURFACE APPLIED**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. Surface Applied Detectable Warning Surface Panels (SA) with an in-line truncated dome pattern surface applied to existing concrete walkways at pedestrian crossing's locations to the dimensions shown on the Drawings, in accordance with the Contract Documents.

**1.2 SUBMITTALS**

- A. Submit per Section 01 3300: Submittal Procedures.
- B. Product Data Sheet: Submit literature describing products, installation procedures, and routine maintenance.
- C. A representative sample of proposed panels to be furnished must be submitted along with the required certified test reports for approval.
- D. Certified test report must be submitted to demonstrate conformance to these specifications. Testing must be conducted by an independent testing laboratory.
- E. Installation procedures must be submitted along with product drawings.

**1.3 QUALITY ASSURANCE**

- A. Detectable warning surface panels and detectable warning tiles must comply with detectable warnings on walking surfaces section of the Americans with Disabilities Act (ADA) - Title 49 CFR TRANSPORTATION, part 37.9 STANDARDS FOR ACCESSIBLE TRANSPORTATION FACILITIES, Appendix A, Section 4.29.2 DETECTABLE WARNINGS ON WALKING SURFACES.
- B. Comply with manufacturer's recommendations.
- C. Protect all specialty items before, during and after installation. Immediately replace or repair any damaged material at no additional cost to the District.
- D. Special warnings for disabled persons shall comply with 2022 CBC Sections 11B-705 Standards.

**SECTION 32 1726**  
**DETECTABLE WARNING SURFACE PANELS SURFACE APPLIED**

1.4 WARRANTY

- A. Manufacturer shall provide a 5-year material warranty.
- B. Installer shall provide a 5-year labor warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Provide Surface Applied Detectable Warning Surface Panels (SA) by ADA Solutions OR equal. Color: Safety Yellow or as approved by the University.
- B. Dome pattern shall be in an in-line pattern only.

2.2 MATERIALS

- A. Composition: Surface Applied Detectable Warning Surface Panels (SA) shall be manufactured using a matte finish exterior grade homogeneous (uniform color throughout thickness of product) glass and carbon reinforced polyester based Sheet Molding Compound (SMC) composite material. Truncated domes must contain fiberglass reinforcement within the truncated dome for superior structural integrity and impact resistance. A matte finish will be required on the Tactile Warning Surface for superior slip resistance performance superior to that offered by a gloss finish. Use of Tactile Warning Surface Products employing coatings or featuring layers of material with differing composition, performance, or color properties is expressly prohibited under this Section.
- B. Color: Color shall be single, homogeneous color throughout panel
  - 1. Federal Yellow (Y), Federal Standard Color No. 33538
- C. Domes: Raised truncated domes of 0.2" nominal height, base diameter of 0.9" and top diameter of 0.45." Truncated dome spacing shall have a center-to-center (horizontally and vertically) spacing of 2.3" – 2.4" measured between the most adjacent domes on square grid.
- D. Fasteners: Surface Applied Detectable Warning Surface Panels (SA) shall have a minimum of twelve (2'x3' Tactile Warning Surface Tile) to twenty-four (3'x5' Tactile Warning Surface Tile) countersunk fastening holes. Color matched, stainless steel 304, flat head drive anchor: ¼" diameter x 1 1/2" long.
- E. Adhesive:

**SECTION 32 1726**  
**DETECTABLE WARNING SURFACE PANELS SURFACE APPLIED**

1. M-1 Polyether Structural Adhesive/Sealant by Chem Link
2. Urethane Elastomeric Adhesive by Bostik (Hydroment Ultra-Set Advanced or Durabond D-818)
3. Approved equal.

F. Sealants:

1. Single Component Urethane Sealant:
  - a. Sources: BASF NP1 by BASF Building Systems or Sikaflex 1A by Sika Corp.
  - b. Colors: Black, Limestone, Redwood Tan
2. Polyether Structural Adhesive/Sealant by Chem Link (M-1)
  - a. Colors: Black, Gray, Limestone, White
  - b. Approved Equal

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Panels shall be installed according to the manufacturer's instructions.
- B. To the maximum extent possible, the SA panels shall be oriented such that the rows of in-line truncated domes are parallel with the direction of the ramp OR walkway. When multiple panels regardless of size are used, the truncated domes shall be aligned between the panels and throughout the entire tactile warning surface installation.
- C. Cutting of SA Tiles may be required to accommodate specific site conditions. All possible attempts shall be made to minimize cutting of the SA Tiles. The minimum acceptable width of the cut SA Tile shall be 9".
- D. For proper curing of adhesive and sealant, air and substrate temperatures must maintain a minimum temperature of 40°F for at least 8 hours after installation of panels.
- E. Verify that substrate is flat across application area of SA panel. Field grinding of concrete may be required to remove high spots and assure a flat substrate is achieved prior to panel installation.
- F. Prior to application of adhesive to concrete substrate, remove any residual contamination by mechanical abrasion, sand blasting, or power washing. On green concrete, remove all release agents, friable and loose concrete. Dry all visible and standing water prior to applying adhesive.

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**DETECTABLE WARNING SURFACE PANELS SURFACE APPLIED**

- G. Apply minimum 3/8" bead of adhesive on the backside of SA panel continuous along both perimeter and interior flat frame surface.
- H. For superior adhesion and panel support in high traffic areas, full coverage of adhesive may be desired.
- I. Set the SA panel(s) true and square to the curb ramp areas as detailed in the Drawings. Allow 1/8" separation between successive SA panels for expansion/contraction.
- J. Drill 1/4" holes to a depth of 2" at all fastener locations provided in top of SA panel. Additional attachment locations may be required at the perimeter of cut panels or as needed to properly secure panel to substrate. Locate new holes through center of truncated domes using a 5-point 1/2" x 82-degree countersink drill bit.
- K. Mechanically fasten SA panels to the concrete substrate using manufacturer supplied composite sleeve anchors with stainless steel drive pins. Ensure that the fastener has been set to full depth, straight and true. Care should be taken when setting the fastener to avoid striking the surface of the SA panel.
- L. Apply a continuous bead of sealant around the perimeter edge of the installed SA panel.
- M. Do not allow foot traffic on installed SA panel until the perimeter edge sealant has fully cured.

**3.2 CLEANING AND PROTECTING**

- A. Protect panels against damage during construction period to comply with panel manufacturer's specification.
- B. Protect panels against damage from rolling loads following installation by covering them with plywood or hardwood.
- C. Remove strippable protective film from SA panel within 24 hours of installation of the panel. Note that hot temperatures and excess exposure to sunlight can cause protective film to permanently adhere to panels surface.
- D. Clean panels not more than four days prior to the date scheduled for inspection intended to establish date of Substantial Completion in each area of project. Clean panel by method specified by panel and tile manufacturer.

END OF SECTION